A

VOYAGE

OF

DISCOVERY AND RESEARCH

IN THE

SOUTHERN AND ANTARCTIC REGIONS,

DURING THE YEARS 1839—43.

BY

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WITH PLATES, MAPS, AND WOODCUTS.

IN TWO VOLUMES.

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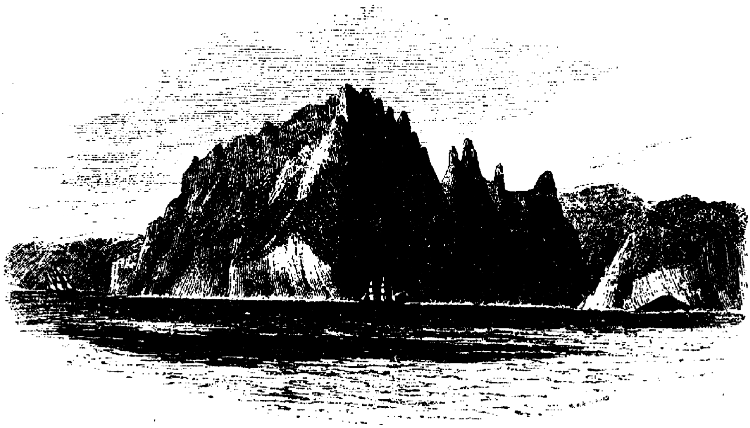

Cape Horn.

CHAPTER I.

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VOYAGE

OF

H. M. S. EREBUS AND TERROR

TO THE

ANTARCTIC OCEAN,

1839—43.

CHAPTER I.

THE success which had attended our first season's operations in the antarctic seas could not fail to raise our hopes and expectations of more extended discoveries on a second visit to those regions; but, as several months must elapse before the proper period for renewing our labours should arrive, we had abundance of time to repair any damages our ships had sustained, and to make all due preparation for the service we had yet to perform.

1841.

Upon examining the vessels, we were much gratified to find the injuries they had received amongst the southern ice were very inconsiderable, and placed so little below the line of flotation of the ships, as to be got at without rendering the operation of heaving them down necessary, and the repairs were well within the reach of our own

1841. resources. We therefore commenced immediately lightening the ships by entirely clearing them out, landing all the stores and provisions, and securing them in warehouses, which his Excellency Sir John Franklin kindly appropriated to that purpose, and devoted exclusively to our use.

Thus also the survey of all the remaining stores, provisions, and materials of every kind was at the same time the more readily accomplished: and we had the satisfaction to find that no one article of any consequence had suffered from the great differences of climate they had been exposed to since our leaving England. Repairing and caulking the ships, stripping and refitting their rigging, cleaning and painting them inside and out, as well as all other requisite operations, were now proceeded with under the immediate direction of the senior lieutenants, Bird and M'Murdo.

The ship's portable observatories were again put up near the Rossbank Observatory, and gave employment to every officer of both ships that could be spared from other duties, in making a careful comparison of all the magnetic and other instruments that had been employed during our southern cruize, with those of the fixed observatory, under the superintendence of Commander Crozier.

The two sets of ship's magnetometers were got into adjustment, and were observed simultaneously with those of the observatory on the term days of the 21st April, 28th May, and 23rd June, on

the expanded system we had all along pursued, with the assistance of His Excellency and those gentlemen volunteers resident in the colony, who had, on every term day during our absence most zealously devoted themselves to the tedious and laborious work; and I have much satisfaction in availing myself of this opportunity of publicly expressing my thankfulness to those gentlemen who continued to afford their valuable services until the entire series of simultaneous observations with the European and American observatories was completed, and to whom all investigators of magnetic science must feel greatly indebted. The following is a statement of the several occasions on which term-day observations were obtained at the Rossbank Observatory, and the names of the gentlemen who assisted Lieutenant Kay, Mr. Scott, and Mr. Dayman in making them. 1841.

1840.					
Nov. 27.	His Excellency Sir J. Franklin	Mr. Gell	Mr. Gunn	Lt. Bagot, 51st	Capt. Moriarty, R. N.
Dec. 23.	- -	Capt. Stanley H. M. S. Britomart	- -	Mr. Nairne	- -
1841.					
Jan. 20.	- -	- -	Dr. Bernard	- -	- -
Feb. 26.	- -	Mr. Gell	Mr. Henslowe	- -	- -
Mar. 24.	- -	- -	- -	- -	- -
April 21.	- -	- -	- -	- -	- -
May 28.	- -	- -	- -	- -	- -
June 23.	- -	- -	Lt. Bagot, A.D.C.	Dr. Bernard	- -
July 21.	- -	- -	Mr. Nairne	- -	- -
Aug. 27.	- -	- -	Mr. Henslowe	Lieut. Bagot	Mr. Nairne.
Sept. 22.	- -	- -	- -	- -	Capt. Moriarty.
Oct. 20.	- -	- -	- -	- -	- -
Nov. 26.	- -	- -	- -	- -	- -
Dec. 22.	- -	Mr. Nairne.	- -	- -	- -
1842.					
Jan. 19.	- -	- -	Mr. Gell.	- -	Mr. Jeffery.
Feb. 25.	- -	- -	Mr. Leicester	Mr. Wright	- -

1841. This plan of observation was discontinued after the term-day of February, and the simultaneous mode changed by new instructions from Professor Lloyd.

The medical officers of the expedition, whose judicious measures had been so successful in preventing even the least appearance of disease in any of our crew, having fortunately no professional calls upon their time, visited the more distant parts of the colony, collecting information, and specimens of the geological character of the country, as well as its other natural productions. Amongst the more interesting of these, and which claims the earliest attention of geologists visiting Van Diemen's Land, is the valley of fossil trees, many of which are beautifully and perfectly opalized, and are found imbedded in porous and scoriaceous basalt, and of which Count Strzelecki remarks, in his admirable physical description of this country,—"Nowhere to my knowledge is the aspect of fossil wood more magnificent than in the Derwent Valley, and nowhere is the original structure of the tree better preserved; while the outside presents a homogeneous and a hard glossy surface, variegated with coloured stripes, like a barked pine; the interior, composed of distinct concentric layers, apparently compact and homogeneous, may be nevertheless separated into longitudinal fibres, which are susceptible of subdivision into almost hair-like filaments."

I had an opportunity of visiting these very

curious remains of a former forest in company with 1841.
his Excellency Sir John Franklin, and conducted to the more remarkable spots by Mr. Barker, the proprietor of the estate of Rose Garland, where they were discovered by him, and by whose care they have been in some measure preserved from the destructive hammers of wandering geologists. The most beautiful of them has, however, been much disfigured, and a great portion of it carried away. Mr. Barker was so kind as to offer all that remained of it to me, for the purpose of being sent to the British Museum; but it appeared to me a kind of sacrilege to remove such a relic from the spot to which it belonged, where it could be seen to so much more advantage by geologists, and, as I had sent still more complete specimens from Kerguelen Island, would be but of comparatively little value elsewhere. I declined his liberal offer, and begged of him to take more effectual measures for its preservation, which he promised to do.

Dr. Hooker's account of his examination of the fossil wood of this valley, will be equally interesting to the geologist and the botanist. He says, — "one of the most remarkable circumstances, connected both with the geology and botany of Tasmania, is the occurrence of vast quantities of silicified wood, either exposed on the plains, or imbedded in rocks, both of igneous and aqueous formation. Those of the former, in particular, are the most striking, from their singular beauty, and the very perfect manner in which the structure of

1841. the woody tissue is retained. Soon after my arrival in the colony, magnificent specimens of a fossil tree were shown me, dug out of a volcanic rock. Some of the masses weighed many pounds, and so perfectly resembled splintered white deal in colour and surface, that to believe them stone, it was necessary to feel how hard and heavy they were. I had afterwards an opportunity of visiting the tree from whence these specimens had been obtained, and collected examples from various parts.

"The general aspect of the fossil is that of the stump of a pine-tree, silicified throughout, about six feet in height, and two feet and a half in diameter at the base. It stands upright, in a cliff of hard black or blue-grey vesicular basalt, by which it was originally enclosed, but which has been quarried away from the exposed portion. The lower part, which, however, shows no appearance of dividing into roots, is cylindrical, the upper much injured and broken into such splinters as I had seen at Hobarton. The circumference (which has been called the bark) is composed of a beautiful rich brown glassy agate: it exhibits only obscure traces of concentric rings, and does not fracture in the direction of these, or of the medullary rays. The rest of the wood is of snowy whiteness, with a grain similar to that of deal. Every successive concentric ring or year's growth, amounting to upwards of a hundred, was well marked, from the narrow pith to the agatized

circumference; but those placed half way between these extremes, on being removed, fell into a snowy-white powdery mass, called "native pounce" by the colonists, resembles amianthus, but is much more brittle. This disintegration of a particular portion of the trunk was not owing to the action of the weather; but to a want of cohesion between the fibres of which the wood is composed.

"Those concentric rings which immediately surround the disintegrated ones, may, with a little force, be divided into laminæ, composed of parallel rows of fibres, beautifully adapted for examination under the microscope: every such ring being divisible, in the direction of the radius, into plates, each consisting of a single row of fibres, held together by the medullary rays, which cross them at right angles like cross-bars. The individual fibres forming one lamina, are of equal length, and in such close juxta-position, that no interstices appear; yet they are separable with the slightest force; proving that the woody substance of the fibre itself is replaced by silica, and that it is not a mere cast of its hollow axis which is preserved.

"In examining silicified woods of the ordinary structure, or such as resemble either the central portion or circumference of this fossil, it is necessary to have thin slices prepared at considerable expense by a skilful lapidary; the object being to obtain such a slice as will display all the characters of the individual fibres. But here such

1841. slices are naturally prepared, and in the most perfect manner possible.

"Each fibre tapers at both ends to a blunt)int, is irregularly four-angular, and solid iroughout, its cavity being filled with transparent lica, and its wood wholly replaced by that subance. The surface is marked with those large rcular discs which are characteristic of all the ne tribe, and those of this fossil are arranged as the living genus, *Araucaria*. I know no species ' that genus, however, in which the fibres com)sing the wood are nearly so large as here. here is also a great peculiarity in the cellular ssues forming the medullary rays: the cells of hich are so much transversely elongated as to be x or seven times as long as broad; and their irfaces present impressions of the discs of the oody fibres between which they are interposed.

"It is not easy to conceive how the silicification ' this part of the tree was effected; for the infilation of a fluid charged with silica between the ɔres would have consolidated them all into one ass. Again, if the fluid were confined to the ıvities of the fibres, forming only casts of these,)aces answering to the thickness of the walls ould be left between every one. A transverse :ction of the agatized portion shows the walls ' the fibres to be of considerable thickness, and to ; composed of a transparent silica, which also :cupies the interstices; whilst their cavities are ıll of an opaque mass of the same substance."

The morning we had appointed for our visit to the

valley proved most unfavourable, and the very heavy rain which fell without ceasing throughout the day, drenching us all thoroughly to the skin, prevented that full investigation which we had desired, and hurried all our operations, so that the erratic blocks or boulders of basalt, of which Strzelecki has given so perfect and animated a description, were only superficially examined by us, but as his account of them is of so much interest both to the geologist and general reader, I prefer inserting it to giving my own. Notwithstanding the unfavourable weather, we all greatly enjoyed our excursion, thanks to the polite attention and true English hospitality of Mr. Barker and his family. Strzelecki proceeds to remark*, that "not less wonderful, and equally interesting, are the erratic blocks or boulders found in the same valley of the Derwent. The masses are composed of cylindrical, somewhat flattened, columns of basalt, confusedly heaped together, with a detritus of pebbles mixed with spheroidal boulders of greenstone rocks, all lodged against an escarpment situated at the bottom of the valley, and on the right hand of the Derwent. 1841.

"This escarpment belongs to the carboniferous strata, and was once connected with another escarpment running across the bed of the river, so as to dam up the present outlet of the waters, and thus to form, in conjunction with the other lines yet existing, the perfect and continuous margin of a basin. The violence with which this embankment

* Strzelecki, Physical Description, p. 148.

1841. was burst asunder is obvious, as is also the action of the water upon it. The position of the detritus, and the direction of the axes of the columns, which lie in position corresponding to the present fall of the country, that is, at the lowest level of the valley, prove that the disturbing forces acted from within the basin.

"This is corroborated further by the evidences of the basaltic and trachytic irruption which occurred after the deposition of the variegated sandstones in Van Diemen's Land. That irruption seems to have appeared first about Rose Garland, which is the centre of the valley. The trees there, which had been fossilized, withstood the intensity of the incandescent matter: other trees, placed in circumstances less favourable to their previous fossilization, were consumed; but being either saturated with water, or still green, they resisted in some measure the process of combustion, and have left behind longitudinal moulds in the basaltic scoriæ, with parietal cavities or impressions, similar to the rugged appearance which the carbonization of a tree assumes externally. Into some of these moulds, a second irruptive force appears to have injected fresh lava, thus forming casts of the consumed trees, and records of the succession of volcanic agencies.

"This irruption was followed by that of greenstone in the upper part of the valley; which, accompanied as it was by a sudden upward movement of the bottom, must have precipitated the waters

from one side of the basin to the other, by which, 1841.
the barrier, being ruptured at the place where the present escarpment is seen, the drainage of the valley was effected.

"In this movement an area of twelve hundred square miles seems to have been raised to the height of four thousand feet, and the valley to have been overflowed by streams of greenstone and basalt, issuing from five mouths — the present lakes of the so-called upper country of the Derwent."

A large collection of geological specimens was made by Mr. M'Cormick and transmitted to England; and in the Appendix I have placed his very interesting account of his geological excursions to the more remarkable parts of the colony. With reference to the beautiful fossil tree of Rose Garland, he gives some additional particulars of its locality, and of the curious vertical moulds of trees, of which Mr. Barker pointed out several to us. He says, "the tree is imbedded in vesicular lava in a vertical position, at the extremity of a ridge of the same kind of rock, seventy feet above the river, which is here only twelve feet broad, winding through a wooded ravine about one hundred yards across. The height of the tree above the ground is six feet; its circumference at the base seven feet three inches, and its diameter at the top is fifteen inches."

A short distance further down the ridge is another tree, also beautifully silicified; only the upper portion of it remains, vertically imbedded in a

1841. chimney-like cavity, in the steep face of the igneous rock; the lower portion having been removed has left its cast in the rock, a foot in diameter, to the extent of seven feet. In the soil beneath I found a fragment of it, having an opaline appearance.

The top of this cliff is about forty feet above the river, which is here somewhat narrower, and the ravine not more than sixty yards wide. About two miles from Rose Garland I saw excavations in a low bank of scoriæ, near a curve in the Derwent, where there is a long low island in the centre of the river, lying parallel with its banks, from which two silicified trees had been removed some years ago: they had all been vertically imbedded.

It seems, therefore, quite evident that they were actually growing when the lava in which they are imbedded overflowed the plain. It is a curious fact connected with this subject that, although large external roots are found on some of those fossilized trees, no branches have ever been discovered; as if it required a certain thickness of trunk to resist the effects of the incandescent matter; and the circumstance of finding these trees in an erect position, would seem to prove that the fossilization occurred at the same time with, and was therefore in some manner produced by, the overwhelming matter; and it would be an interesting fact to ascertain whether the roots of any of these trees are still adherent to them, or whether any movement of the whole mass down the valley, during the process of solidification, has removed

the trees from the places where they originally grew; 1841.
similar to the progressive movement of the glaciers of Switzerland down the valleys of the Alps.

Before concluding my remarks on the highly interesting fossil remains of the Derwent valley, I cannot omit to notice those which are found in the indurated clay of Point Puer, at Port Arthur, and at Eaglehawk Neck, which is a narrow, low, sandy isthmus, connecting Forestier's with Tasman's peninsula; both of which places I visited in company with the governor. The severe penal settlement of Port Arthur, to which the doubly-convicted felons are transported from New South Wales and Van Diemen's Land, — the juvenile establishment of Point Puer *, where between five and six hundred convict boys are taught useful trades, — the isthmus of Eaglehawk Neck, where furious dogs are chained to guard the pass, and prevent the escape of convicts from Port Arthur, the coal-mines and sandstone quarry, being all objects of interest to the stranger, were visited by nearly all the officers of the expedition, but are too extensively known to require any description here. I am glad, however, to avail myself of a communication from Dr. Jeanneret, the physician to the establishment at Point Puer, containing some interesting particulars respecting the peninsula of Tasmania, and its fossil remains.

"*Tasman's Peninsula* is the rugged land at the south-eastern extremity of Van Diemen's Land. It

* For a statistical account of this establishment, see Appendix, No. III.

1841. is deeply indented with bays and promontories, and contains about 120 square miles of surface, chiefly mountains, varying in elevation from 700 to 3000 feet. It is for the most part thickly wooded with the Eucalyptus globulosa, E. robusta, E. piperita, E. myrtifolia; Acacia decurrens, A. affinis, A. melonoxylon, A. saligna, A. verticillata; Zerea and Alsophila, in the hills and gullies. In many parts, particularly on the coast, are Casuarinæ, Banksiæ, and the Exocarpus cupressiformis; in this respect agreeing with the other parts of the island. There are very few coniferæ, if any, of any magnitude.

"The nature of the soil varies with the neighbouring rocks. The basaltic hills, in those parts which I have visited, are covered, as in the neighbourhood of Hobarton, with a good-bodied clay, chiefly of a red tint, encumbered with masses of basalt, in a more or less forward state of degeneration. The chief ranges are of this description at the summit. In the lower levels sandstone often crops out, having the basalt overlying and subjacent. Indeed, basalt may be said to be the prevalent rock. The peninsula of Point Puer is formed of an indurated clay, containing fossil remains, consisting chiefly of marine shells, gorgoniæ, corals, &c. I have found a vertebra imbedded. I think it is the cervical vertebra belonging to an animal about the size of a sheep. I cannot now find it amongst the specimens. On this rock rests clay, varying in purity from the finest pipe-clay to ochre. In this alluvium are found silicious fossils of two species of shells, similar to those fossilized

with aluminous earth in the strata of the same kind at Eagle Hawk Neck; particularly the butterfly shell, as it is called, upon the spot. The siliceous fossils of this genus are almost all imperfect, but do not bear marks of attrition: the contained animals are as completely fossilized as the shells. Their structure, which is curious, may perhaps be as fully demonstrated from these as by living specimens. The shell of the butterfly appears to be a trivalve, the third valve of which is rarely found attached. It is a kind of stalk, by means of which the animal seems to have been fixed to the rocks. The butterfly shell is not so plentifully distributed in the indurated clay rock at Point Puer as it is at Eagle Hawk Neck. The siliceous petrifactions abound in specimens of agate, chalcedony, cornelian, semiopal, and milky quartz; and in druses containing crystals of quartz, chiefly pellucid and amethystine. Pieces of granite, basalt, hornstone, siliceous and fossilized wood, &c., are found in the rock; but these are not so plentiful, nor, generally speaking, of so large a size as at Eagle Hawk Neck; the rock is also softer, being less impregnated with siliceous admixture. It is a breccia, consisting of an impalpable aluminous deposit, which, during its precipitation, has involved substances of various kinds, and remains terrestrial and marine. It contains numerous holes, such as would be formed by the entombment and subsequent decomposition of vegetable and animal forms. I once thought I could trace out the bed of a hawksbill turtle; and roots reduced to carbonaceous and fossilized states

1841. are not uncommon. The rock is, as usual, traversed by veins of oxide of iron, and in some parts quantities of soft pyrites are found. A well, sunk to the depth of seventy feet in the rock, affords a chalybeate water of unusual strength, an analysis of which I hope to present on a future occasion.

"The slate clay in this locality may be compared to a riband in a sea of basalt; but it is also found varying, nevertheless, as it respects degree of induration, and the quantity and nature of its fossilized contents, in various parts of the peninsula. At Eagle Hawk Neck, as I before mentioned, it is replete with fossils of indurated clay: these are generally coated with oxide of iron. The basis of the rock at this locality bears the semblance of wacke. The extreme regularity of the disposition of the veins of oxide of iron has obtained for it here the designation of the "*Tesselated Pavement**," forming, at the verge of the shore, planes of rectangular and rhomboidal stones, similar to the well-paved roadway of a town. In many parts of the peninsula the rocks of each description,—basaltic, silicious, and aluminous, are partially covered by a bed of sand, mostly of no great depth, forming the Tea-tree Scrubs (Leptospermum). The *only* specimen from the coal mines at Slopen Main, is a piece of anthracite, containing vegetable impressions." †

* For a detailed account of this curious production of nature, see Appendix.

† This communication was accompanied by a complete and valuable set of specimens, now deposited in the British Museum.

As soon after the first term-day observations were completed, as other duties admitted, I availed myself of the liberal offer of Mr. Blackett to place his yacht, the "Albatross," at my service, to enable me to extend the magnetical observations some distance along the coast, to visit, and determine the position of, the south-west cape—a desideratum of great importance—and to make a survey of the great bank on which we had struck soundings at a distance of nearly one hundred miles from the coast, and which, from the nature of the ground, I believe likely to prove a valuable fishery to the colony. Both the latter purposes were frustrated by a continuance of unfavourable weather, and from finding the rigging of the vessel to be so slight, and so much weakened by long disuse, as to unfit her for contending against the rough weather that at this season of the year prevails along the southern shore of the island. Commander Crozier accompanied me on this excursion, which we were unable to extend beyond Recherche Bay, owing to the loss of our top-mast and straining the head of the main-mast. 1841.

The examination of the numerous fine harbours in the Channel of Entrecasteaux occupied us several days, but their full description is unsuited to a place in this narrative. It may be sufficient here to state that the channel affords excellent anchorage in all parts of it, and the access to it has been rendered perfectly safe and easy by the beautiful light-house which has recently been erected on

1841. the eastern cape of the inlet, called Bruni Head, which from its elevated position may be seen at a great distance, and is a sure mark by which the Actæon Reef may be avoided. There is no other danger after passing Muscle Bay: in the channel the soundings are regular, and the shores bold, as far as the entrance of the Huon river; from this point a mud bank lies off the west shore of the channel, but its limits are well defined by buoys, placed at small distances apart; these are to be left on the port hand in running up to the Derwent. Recherche Bay is not a commodious harbour for ships drawing more than seventeen feet water, and is too exposed for purposes of general refitment. Muscle Bay and Esperance Bay are better adapted for that purpose, when it may not be necessary to procure materials or assistance from Hobarton. From the hill where Mount Royal signal station once stood, the pilot informed me that the Pedro Blanco, or Eddystone rock, could be seen over part of Bruni Island, distant about thirty miles; the weather was too unfavourable when we were off this point, or we would have ascended the hill, to get angles for the survey. The shores of the inlet are extremely beautiful — their picturesque and broken outline, and the luxuriance of the vegetation, whose dingy green colour we had now become so accustomed to, as almost to have forgotten the rich and varied verdure of our own forests, impressed the mind with feelings of regret that so charming a country should remain a useless

desolate wilderness, although capable of producing an abundance of food for a large population, whilst so many thousands in England have hardly sufficient to subsist on from day to day, and whose labour here would soon raise them to independence and comfort, in a land whose scenery and climate are equal to the more healthy and admired parts of our own country. But the scenery* of the Huon is of a still richer character—its banks are clothed with the loftiest and most valuable timber of the colony. Some of the trees we measured were a hundred and eighty feet high, and twenty-eight in circumference, and cover the ground with so dense a forest, that it requires great labour to clear it for agricultural purposes; but when once accomplished, the same rich soil, which produces such fine timber, fully repays the settler by the abundance it afterwards yields under moderately good management. One of the trees pointed out to us rather exceeded two hundred feet in height, and was thirty-eight feet in circumference about three feet from the ground. Along each shore of the inlet and river, at every two or three miles, we observed a small wooden hut or two, and a small sloop building near them; quantities of firewood, the refuse of the trees that had been cut down for the timbers and planking of the vessel, were piled in heaps ready to be shipped off to supply firewood to Hobarton. The gratification we should otherwise have felt in contemplating the useful purposes to which these hitherto unproductive forests were

1841.

1841. being applied, was quite lost in the reflection that the people themselves were of the most immoral and profligate character, and generally either runaway convicts or fugitives from society, on account of crimes they had committed, and by this kind of labour earned a sufficiency to gratify their habits of drunkenness and debauchery. Whilst lying at anchor off the mouth of the Huon, in the middle of a rather dark night, we narrowly escaped being run down by a vessel coming up the channel before a strong southerly wind; they had no one on deck except the man at the helm, but, by the vigilance of a dog, which was evidently on the look-out, and which barked most violently, directly he saw us the man altered the course of the vessel, just in time to avoid a serious collision, which we had no means of averting.

In the great cove on the right hand, about five or six miles from the entrance of Entrecasteaux Channel, there is very good anchorage at its head. You may go close in to the sandy beach, from whence a road leads up to the light-house on Bruni Head, an object of no small interest in this country, and one, as I have before remarked, of considerable advantage to the commerce of the capital. Vessels that enter the channel late at night generally anchor under the shelter of Partridge Island, which lies off the south point of the great cove, with the island bearing about N.W., so as to afford protection from the heavy breezes which blow from that quarter. You may anchor in perfect safety in ten fathoms water, on a good holding ground. Between

Partridge Island and the main, the water is so 1841.
shallow, as barely to admit the passage of a boat, at low water, so that no swell of any consequence can come into the cove from seaward. The little cove four miles further up is a much snugger anchorage; and Esperance Bay, on the opposite shore, is said to be the best harbour in Van Diemen's Land: but as our time did not admit of our examining it, I am not able to give any opinion on its capabilities except that from the entrance it appeared to be an excellent harbour. Port Arthur, in Tasman's Peninsula, however, possesses many advantages, especially for men-of-war wanting extensive repairs, or having to heave down. The large amount of convict labour, which is always available, and the exclusive use of spacious storehouses, in which the ship's crew may be comfortably accommodated, and where the stores and provisions may be kept in perfect safety during the process, are material conveniences on such occasions: and, added to these, the vigilance of a military guard, so essential, and there carried out to the utmost perfection and severity, in order to prevent the escape of convicts from the doubly penal establishment, is equally efficacious in preventing the straggling of the crew into the town, where, being exposed to the temptation of all kinds of excesses, they are at Hobarton, as well as at most seaport towns, likely to be robbed by those who are ever waiting to prey upon the incautious and unsuspicious sailor.

1841. My principal object in visiting Port Arthur was to afford a comparison of our standard barometer with that which had been employed for several years by Mr. Lempriere, the Deputy Assistant Commissary General, in accordance with my instructions, and also to establish a permanent mark at the zero point, or general mean level of the sea as determined by the tidal observations which Mr. Lempriere had conducted with perseverance and exactness for some time: by which means any secular variation in the relative level of the land and sea, which is known to occur on some coasts, might at any future period be detected, and its amount determined. The point chosen for this purpose was the perpendicular cliff of the small islet off Point Puer, which, being near to the tide register, rendered the operation more simple and exact; the governor, whom I had accompanied on an official visit to the settlement, gave directions to afford Mr. Lempriere every assistance of labourers he required, to have the mark cut deeply in the rock in the exact spot which his tidal observations indicated as the mean level of the ocean. The tides in the Derwent were too irregular, being influenced greatly by the prevalence of winds outside and the freshes from the interior, so that we could not ascertain with the required degree of exactness the point of mean level. It would have been desirable to have fixed a similar mark on some part of the opposite side of the island, but a prolonged series of preliminary ob-

servations of the tides are necessary, and as these 1841.
had not been obtained, and our limited stay, as well as the full employment for all our observers, which the necessary experiments with the magnetometers provided, did not admit of our doing it, I can only hope that some individual with like zeal for science with Mr. Lempriere, and with time at his disposal, may yet accomplish this desideratum. I may here observe, that it is not essential that the mark be made exactly at the mean level of the ocean, indeed it is more desirable that it should be rather above the reach of the highest tide: it is, however, important that it be made on some part of a solid cliff, not liable to rapid disintegration, and the exact distance above the mean level (which may also be marked more slightly) recorded on a plate of copper, well protected from the weather, by placing a flat stone with cement between, upon the plane surface or platform which should constitute the mark from which the level of mean tide should be measured.*

The most desirable position for such another mark would be near the north-west extremity of the island, and in the vicinity of Cape Grim, near which the Van Diemen's Land Company has a small establishment.

The fixing of solid and well secured marks for the purpose of showing the mean level of the ocean at a given epoch, was suggested by Baron von Humboldt, in a letter to Lord Minto, subsequent to the sailing

* See Cosmos, p. 288. and note, p. 95.

1841. of the expedition, and of which I did not receive any account until our return from the antarctic seas, which is the reason of my not having established a similar mark on the rocks of Kerguelen Island, or some part of the shores of Victoria Land. Upon this subject that great philosopher observes, that "if similar measures had been taken in Cook and Bougainville's earliest voyages, we should now be in possession of the necessary data for determining whether secular variation in the relative level of land and sea is a general or merely a local phenomenon, and whether any law is discoverable in the direction of the points which rise or sink simultaneously."

By the kindness of Sir John Franklin, I was also enabled to extend my magnetic observations for determining the lines of equal variation, dip, and intensity across the island to Launceston, and thence down an arm of the sea called the Tamar to George Town, where I received a kind welcome, and every assistance, from Lieutenant Friend of the royal navy, the port officer. Launceston, the northern capital of the island, as it has been sometimes called, is very inferior as a town to Hobarton, but the country about it is far more beautiful and valuable. Many of the wealthiest of the colonists have settled in its neighbourhood, but they do not seem to possess any large amount of public spirit, so far as regards the improvement of their favourite city, arising chiefly, I believe, from the expectation that the colonial government would

and ought to do all that is desirable without their assistance. Vessels of large size come up the river, as it is called, to the town of Launceston; but, unaided by steam, the navigation is rather intricate. George Town, at the entrance of the inlet, is a pretty little village, promising, at some future period, to become a watering place for the fashionables of Launceston; the access to the port is rendered somewhat dangerous and difficult by the bar across its entrance. 1841.

During this journey across the country I had an opportunity of witnessing some extensive improvements of which William Kermode, Esq., of Mona Vale, has set the example, by the introduction of a system of draining and irrigation, in which the fertilising effect of water is brought so prominently into observation. Strzelecki has given a very interesting account of these operations, and has pronounced a well-merited eulogium on the perseverance and public spirit of the enterprising proprietor.

We diverged from our direct route, also, as we returned, in order to pass through some of the richest land in the colony, and from which, owing to the agricultural skill and industry of Mr. Archer, and a few other proprietors, the most astonishing crops are produced. In traversing this part of the country in particular, it was impossible not to be struck with the truth of the general remark of all writers, that the diversity of hill and dale, forest and tillage, forming together with the rich and

1841. beautiful plains traversed by streams, and the comfortable mansions, surrounded by pleasure grounds, of the wealthier settlers, the perfection of agricultural landscape, recall to the recollection scenes so similar in our own country, that imagination could easily find a counterpart to many of the richest scenes of rural beauty which our most admired counties possess. Indeed, after being a short time in this charming country, it is difficult to feel that we are at the farthest distant point of the earth from our own loved land; and wherever we went, the hearty welcome and liberal hospitality with which we were received, seemed to strengthen, in no small degree, the impression of resemblance to our own happy island, except that in this the necessities of travellers being so much greater, offers a proportionally wider field for the exercise of these generous sentiments and conduct.

Towards the end of June we had finished all the repairs and refitment of the ships; had embarked provisions and stores to last us for three years, and were busily employed preparing the vessels for sea, intending, before the season for making another attempt to penetrate to the southward, to visit Sydney, in New South Wales, and the Bay of Islands, in New Zealand, for the purpose of getting magnetometric observations comparative with those of Rossbank Observatory, Van Diemen's Land, as we had done last year at Aukland Island, with the view to ascertain whether the cause of pertur-

bation produced exactly similar and synchronous 1841.
effects on instruments placed at the respective distances of six hundred, and fifteen hundred miles, and which we had only two opportunities last year of observing, at a distance of about a thousand miles from Van Diemen's Land.

The iron tanks, chain cables, anchors, and all iron materials which had necessarily been removed during the repairs of the vessels, having been replaced in the exact spot from which they had been taken, the process of swinging the ship round, to redetermine their united effect upon the compass, was accomplished on the 29th of June. We were surprised to find that both in amount and direction it had very considerably altered. Thus the points of no effect had changed since October, 1840, from nearly N. by W. to nearly N. by E., and from nearly S. by E. to nearly S. by W.; and the amount and direction of extreme deviation from 4° 6′ with the ship's head E. by N. to 5° 30′ with her head E. S. E., and from 4° 16′ with her head W. S. W. to 5° 13′ with her head West.

These results point out in a striking manner the necessity of frequently repeating experiments of this nature, where an ordinary amount of accuracy is desirable; as they moreover serve to prove that some kinds of iron, and perhaps various positions in which it may be placed with reference to the line of dip, render them more susceptible of change than others, or no alteration could have occurred in the direction of the points of minimum and

1841. maximum effect, and the amount of deviation only would have been affected had the power of the iron in the ship been uniformly increased. Colonel Sabine ascribes this change in the amount of deviation to a different, and perhaps a more probable, cause; and as it is a point of some importance to determine, I will give his explanation in his own words, first remarking, however, that as the greatest care had been taken that the distribution of iron in the ship should be always the same, or as nearly so as possible, the deviation of the plane of no effect amounting to more than a point and a half, cannot have arisen from any slight modifications of this nature, but must be ascribed to some other cause. He observes*: —

"After the arrival of the expedition at Hobarton, and before it sailed to the Antarctic Circle, a similar series of observations was made in the Erebus, on the 29th of October, 1840, and again repeated on her return to Hobarton the following autumn, viz. on the 29th of June, 1841. The south end of the needle being now the one which dipped below the horizon (the dip being 70·40 S.), the deviation of the compass was found to take place in the contrary direction to that which had been observed at Gillingham, the disturbance being towards the *west* as the ship's head went round from north by east to south, and towards the *east* as her head passed from south through west to north.

* Phil. Trans. R. S. Part II. 1843, p. 152.

"The line of no deviation was not found to correspond accurately with the north and south points of the compass on either of the occasions at Hobarton; but in 1840 coincided more nearly with the north by west and south by east, and in 1841 with the north by east and south by west. We may perhaps ascribe with probability irregularities of this nature to slight modifications in the distribution of the iron at different periods, which we cannot but view as of not unlikely occurrence; for example, such as might be occasioned by the ship being secured at different times by the starboard or larboard chain cable. In looking through the observations of the Erebus, it is evident that there was no systematic or constant deviation of the plane of the ship's attraction from that of her principal section; but that the points of no disturbance were sometimes a little on the one side, and sometimes a little on the other, of the north and south points. It appears, therefore, not improper to class these irregularities with those others of accidental occurrence which occasion similar discordances in partial results, and are usually ranged under the general technical head of errors of observation. 1841.

"If, further, we compare generally the deviations in 1840 with those of June 1841, the latter appear systematically rather the more considerable in amount. Viewed as a single fact, this circumstance might be regarded simply as indicating that some change had taken place in the interim in the

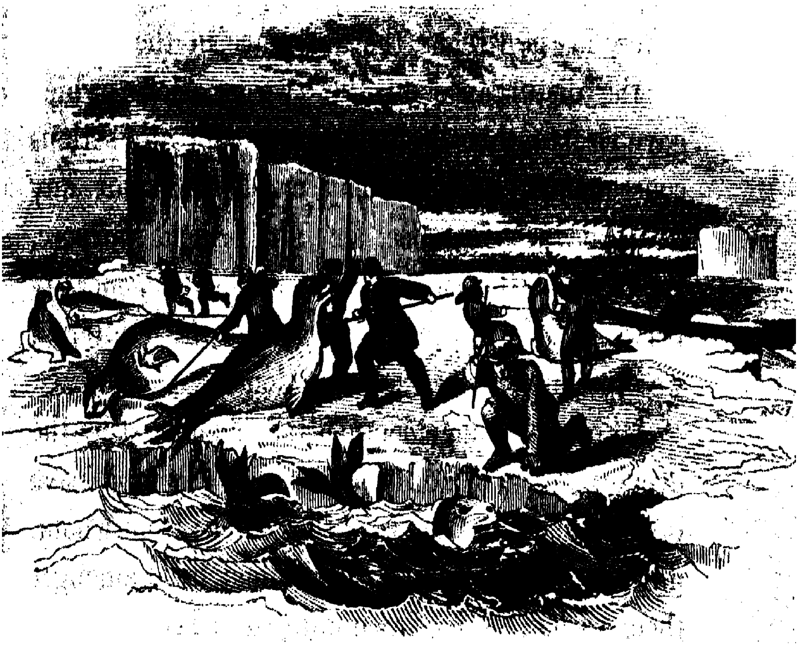
1841. arrangement and distribution of the ship's iron, and an easy and natural explanation might appear to be afforded. It is, however, one of several facts which have presented themselves in the course of a careful examination of the observations of the first two years of the expedition, which seem to point to the possibility of a somewhat different cause; viz., that when a ship changes her magnetic latitude, the corresponding change in the magnetism of the ship, or, more strictly, in that portion of it which is derived from induction, follows, but does not always, or altogether, take place instantaneously. It would accord with this supposition, that the disturbance of the compass should be less in the Erebus on her first arrival at Hobarton in 1840, than on her return there in 1841; because in 1840 she had recently passed through the lowest magnetic latitudes, and in 1841 she came immediately from the highest. The observations in 1840 give a less value for a tan θ*, than those of 1841; and taking the dip at Hobarton as the value of θ, to which the induced magnetism of the ship on both occasions should strictly correspond, we should have a less value for a in 1840 than in 1841; whereas, if with the same dip we take a mean between the disturbances of the compass on the first arrival and on the return, by which we may be conceived to neutralise in a great measure the temporary influences which

* See Phil. Trans. R. S. p. 149.

have been supposed, we find the value of a to be almost identical with the result of the former experiments at Gillingham. From this accordance in the value of the constant, in dips which differ so greatly as from 69° N. to 70° S., we should infer the probability—first, that the local attraction of the Erebus was due to induced magnetism alone, the influence of any portions of iron, which, in the strict sense of the term, were permanently magnetic, being insensible; and secondly, that no material change affecting the standard compass had taken place in the distribution of the iron. These inferences are by no means inconsistent with the supposition above suggested, that some portions of her iron might be of a quality intermediate between that of perfectly soft iron, which undergoes instantaneous change, and that of iron which acquires permanent magnetism, and that such portions should be liable, in regard to their magnetic condition, to be more or less in arrear of the ship's magnetic position. I abstain from entering further into this question at present, because a fitter opportunity of doing so will be afforded when the whole of the observations of the expedition shall be collected, including those which have to be made at Rio de Janeiro on the return from the high latitudes of the south, and in England, after passing through the low magnetic latitudes of the equatorial region. Should it prove that the induced magnetism of a ship due to any particular dip requires time for its full development, more or

1841. less, according to the various qualities of her iron, the corrections to be applied may possibly in some ships be considerably complicated thereby; fortunately in the Erebus the difference in the amount of the disturbance on the two occasions, which gave rise to this discussion, is not of any serious consequence; and we may employ, without any material inconvenience, for our present purpose, the mean of the two series as applicable generally between their respective dates, for which interval we especially desire the corrections."

All other arrangements being completed by the evening of the 6th July, we on that day took leave of our numerous friends in the colony; from whom, during the several months we had lived amongst them, we had received an uninterrupted continuance of the greatest possible kindness and hospitality, and for many of whom we must ever entertain the liveliest feelings of gratitude and regard.



Sketched by Dr Hooker

Seal Hunting on the Pack Ice. Page 162.

CHAPTER II.

Departure from Hobarton. — Anchor in Port Jackson. — Term-day Observations. — Heavy Fall of Rain. — Appearance and State of Sidney. — Paramatta Observatory. — Magnetic Observations at Garden Island. — Sail from Port Jackson. — Change of Temperature. — Coast Current. — Falling Stars. — Temperature of the Ocean. — Coral Bank. — Cape Maria Van Diemen. — Bay of Islands — Anchor in the Kawa Kawa. — The American Corvette, Yorktown. — Position of Observatory.

CHAPTER II.

EARLY on the morning of the 7th of July we weighed, and stood down the river; his Excellency Sir John Franklin, and many of our friends, came on board for the purpose of seeing us fairly off, and bidding us a long farewell. With a fresh northerly breeze we had soon passed the beautiful and placid scenery which each bank of the river presents to view; and here, as in many parts of the interior, the peaceful settlements and improving farms which are scattered profusely over the face of the country, in the highest state of cultivation, again recalled to our minds some of the richest and most beautiful scenery of our own country, and impressed us with a feeling, no doubt greatly influenced by the hospitality and affectionate friendship we had experienced from its inhabitants, that we were taking a final leave of our southern home, and perhaps should never again meet with many of those from whom we had experienced so much kindness. At 10 we hove to in Storm Bay, when Sir John Franklin and our friends took leave of us, giving and receiving three hearty cheers at parting. They returned to Hobarton in the government brig, and we pursued our course towards Cape Raoul. In the afternoon we passed the entrance of Port Arthur, one of the best harbours in Van Diemen's Land. It is situated

1841.
July 7.

1841. between Cape Raoul and Cape Pillar; and, although a dense mist concealed these two remarkable capes from our view, we occasionally caught a glimpse of the lofty basaltic columns of Cape Pillar, which we passed at a few miles' distance, just before dark. The wind being fresh from the northward, we felt the effects of a heavy irregular sea as we stood to the eastward during the night, when we got from under the lee of the land.

July 8. We tacked to the westward before daylight, but light variable winds and a heavy N.E. swell prevented our making any progress; so that, at noon Cape Pillar was still in sight, at a distance of eleven or twelve miles, bearing S. 58° W., our latitude being 43° 5′, long. 148° 21′ E. Thick weather, with rain, the usual accompaniments of a northerly wind, prevailed during the day; but the swell, as it subsided, became more regular, and the wind veered to the westward in the evening. Cape pigeons, blue petrel, and the dusky and black-backed albatrosses were our companions. Many large patches of seaweed were passed through, and a few whales were seen during the day.

July 9. The next morning the wind became more favourable, and before noon we had all studding-sails set. Our run to Port Jackson was unattended with any circumstance worthy of notice. At day-
July 11. light, on the morning of the 11th, Cape Howe was seen bearing N.N.W.; and at 1 P.M. soundings were obtained in two hundred and ninety-two fathoms, on a bank of fine sand and greenish mud,

Cape Howe at the time bearing N. 29° W. distant about seventeen miles: the temperature at that depth being 49·7°; that of the surface and of the air being 59°. 1841.

On the following day, when in latitude 37° 20′ S. long. 151° 36′ E., we had no soundings with five hundred and fifty fathoms, the temperature of the sea at that depth being 46·2, whilst that of the surface was 60°. July 12.

On the morning of the 14th we were off the extensive and celebrated opening called Botany Bay by Captain Cook, and arrived between the narrow heads of Port Jackson at noon. Here a pilot came off to us; and, the wind dying away to a perfect calm, we lowered our boats, and towed the ships up one of the most magnificent harbours in the world. A boat from the shore brought me a kind note of welcome from His Excellency Sir George Gipps, with the offer of every assistance in his power to promote our objects; and immediately that our ships were anchored between the government demesne and Garden Island, Commander Crozier and I went on shore to pay our respects to the governor, from whom we experienced the most cordial reception. I obtained permission from him to put up our observatories on Garden Island, a convenient and retired place, where we could uninterruptedly pursue our work. I should have preferred making our observations at Fort Macquarie, on the exact spot where Lieutenant Wilkes had obtained his, during the visit of the July 14.

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United States' exploring expedition in 1839*; but at this time it was quite unfit for magnetic observations, from the number of iron guns and piles of cannon balls that were distributed about it, so that instruments could not be placed on any part of the fortifications without being subject to their vitiating influence.

As my chief object in coming here was to obtain a series of magnetometric observations in comparison with those made at the observatory at Hobarton, on the approaching term day of the 21st, with the view to ascertain how far simultaneous observations, at periods previously agreed upon, as well as on days of considerable perturbations, might be depended on for determining the difference of longitude between the two places of observation, we were obliged to work hard day and night to get the instruments fixed and adjusted in good time. By the untiring diligence of Commander Crozier, however, and of the officers of the Erebus and Terror, every thing was in perfect order and in readiness to begin several hours before the appointed time, and a complete and satisfactory series of experiments was made. During the day we were honoured by a visit from the governor, who inspected the ships and observatories, and expressed a warm interest in the objects of our undertaking. Nothing could exceed the kind atten-

* A detailed and highly interesting account of the state of the colony at that time is given by Lieutenant Wilkes in the second volume of the "Narrative of the United States' Exploring Expedition," pp. 163—274.

tion and hospitality which were manifested by His Excellency and Lady Gipps to myself and the officers of the expedition during our stay at Sydney; and I have much pleasure also in acknowledging the civilities that were offered to us by the principal inhabitants of the colony, but which the necessity of unremitting labour at the observatories obliged us to decline. I had also the high gratification of meeting with some very old friends in Captain Philip Parker King, R. N., Mr. M'Leay, the late colonial-secretary, and his son Mr. W. S. M'Leay, who had been several years resident in the colony, and from whom I learnt many interesting particulars of the cruize of the American expedition, which had touched here on its return from the Antarctic Regions; but as the greatest secrecy had been prescribed to its commander by the government, I could, at that time, place but little dependence on what I heard, but which has since turned out to be perfectly true in the principal particulars.

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Mr. M'Leay's house being situate very near to our ships, we had many opportunities of enjoying the kind hospitalities he so liberally and continually extended to our officers, and whose sentiments towards myself were those of almost paternal regard and solicitude, which the remembrance of having, in my younger days, assisted me in my scientific pursuits, may probably have in some degree tended to awaken.

In the beautiful grounds, consisting of above twenty acres, about Mr. M'Leay's house, and which

1841. July. are laid out with the greatest taste, Dr. Hooker had an opportunity of examining many rare and curious plants, which had been collected together from various parts of the world, and naturalised by the care and skill of the proprietor and his sons, forming a botanic garden of great value, and, even now, of great interest; although at the most unfavourable period of the year, being in the depth of winter, and in the rainy season.

The quantity of rain which sometimes falls at this place is truly astonishing: during our stay of twenty-one days, it unfortunately happened for us, but happily for the country, that there were only four days on which no rain fell; and on two or three occasions it came down in perfect sheets of water, so that, on the afternoon of the 16th, during two hours and a half, more than three inches of rain fell into the rain gauge at Garden Island: and again on the 17th, between 7 A.M. and noon, nearly five inches were recorded. On mentioning these facts to Sir George Gipps, he told me that on one occasion twenty-three inches fell in the course of twenty-four hours, as measured by a rain gauge on the South Head, an amount far exceeding any thing I had ever before heard of, and equal to the quantity that falls during a whole year in some parts of Great Britain. It produced great destruction of property in its course to the ocean; and there are everywhere to be seen numerous evidences of these periodical deluges in the deeply-worn watercourses, in the soft sandstone of which the country is chiefly composed. I have since been

referred to an account of a fall of rain which greatly 1841.
exceeds that which was recorded at South Head, July.
or I should have had some difficulty in believing that some mistake had not been made in the register. It is stated by M. Arago*, that at Joyeuse, in the department of Ardêche, according to the register of M. Tardy de la Brossy, the maximum of rain in a single day, in the course of twenty-three years, was found to have occurred on the 9th August, 1807, and amounted to what then appeared the enormous quantity of 9·87 in.: but, on the 9th Oct., 1827, in the space of twenty-two hours only, there descended at the same place 31·17 inches of rain.†

The greatest quantity which fell into our rain gauge in twenty-four hours was 8·52 inches between noon of the 16th and noon of the 17th of July; during the whole of which period the wind was light from the SS.W., and the mercury in the barometer so high as 30·38 inches: it fell to 30 inches when the rain ceased in the afternoon of the 17th.

But far more serious drawbacks to the prosperity of the colony are the occasional withering droughts, which destroy the vegetation in a most awful

* Annales de Chimie, tome xxxvi.

† Those who witnessed the heavy fall of rain and its destructive effects, which occurred between $3^h\ 30^m$ and $6^h\ 30^m$ P.M., on the 1st August, 1846, in London; during which above four inches of rain fell, may form some idea of the quantity here mentioned; but who can conceive the terrible consequences that would have resulted had it continued without intermission twenty-four hours?

1841. July. manner. Not more than three or four years before our visit, the colonists suffered severely from one of those visitations, and a famine of bread, and still more a scarcity of water, were dreaded. The four pound loaf was sold for two shillings and eightpence, and the Commanding officer of Engineers reported that there was not at one time in reality a larger quantity of water in the reservoir than was sufficient for seven days' consumption. The extreme sandiness of the soil, and total absence of springs are great disadvantages; but the measures which Sir George Gipps has adopted, of damming up the small watercourses when filled by the winter floods, will provide a supply for the whole summer season, and prevent the recurrence of so much distress in future. He told me, that, during the drought of 1838, a gentleman from the interior rode his horse forty miles without being able to give him a drink, and had eventually to pay half-a-crown, at an inn on the road, for less than a quart of water.

I regretted extremely that it was not in my power to see more of the present condition and resources of the colony: the constant attendance at the observatory, and the unfavourable weather, prevented my making any excursions into the country, or indeed seeing either the town or public buildings to advantage.

The first appearance of the colony impresses the mind with wonder and admiration; and it seems hardly possible to imagine that little more than fifty years have elapsed since a "howling wilder-

ness" occupied the place on which this great metropolis of a future empire now stands. Its magnificent harbour, or rather series of harbours, so beautiful to the eye of the painter, so perfect to that of a sailor,—so easy of access and egress, and so perfectly capable of containing and protecting, by the erection of judiciously placed fortifications, any number of shipping, are advantages that more than compensate the natural defects of a barrenness of soil, and proportional deficiency of luxuriance in the vegetation of its immediate vicinity; whilst the princely mansions of the country gentlemen, which have been built on each side of the harbour, give evidence of the wealth and industry of the colonists. Just at the period of our visit, the colony was suffering under a severe commercial pressure, brought on by overtrading, and the want of labourers. Until very lately, the settlers had enjoyed the benefit of convict labour, but, since they had obtained their prayer to the Home Government that no more convicts should be sent into the colony, they have been obliged to pay their common labourers about thirty pounds a-year, in addition to very expensive rations. Accounts recently received, however, announce the gratifying intelligence that they have nearly recovered the shock, and that their commercial transactions are now proceeding more prosperously and on a more solid foundation. The monetary distress and confusion which had been produced by excessive speculation, and which had borne

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1841. July. heavily even on some of the more wealthy individuals, have been overcome by economy, industry, and perseverance in developing the resources of the country; and the great difficulties and embarrassments of that time have been succeeded by years of general prosperity and comparative abundance. Since then, also, to the Legislative Council of New South Wales has been added a third class of persons, in the representatives of the people; a measure of very doubtful benefit to the colony, and considered by many to be the first great step towards its separation from the mother country. It now consists of three classes,—first, the official servants of her Majesty; 2nd., Gentlemen of independence, nominated by the Crown; and, 3rd., Representatives elected by the people. Three years only have yet elapsed since the first meeting of the Legislative Council* as enlarged by act of Parliament, for the government of the colony, and the admitted general success of the experiment cannot but be in a great measure ascribed to the commanding influence and abilities of the present Governor, Sir George Gipps, and to the firmness, acknowledged talents, and universal love and respect entertained by all classes towards Mr. M'Leay, the venerated Speaker of the Assembly; and we may hope that under such guidance and example, now that this mode of government may be considered as established, the people will show themselves fit for, and worthy of, the trust

* It was opened on the 3rd of August, 1843.

which has been confided to them, and will select as their representatives those only who will devote themselves to the duties required of them, and direct the best energies of their minds to elevating the commercial, social, and moral condition of the colony.

1841.

July.

It is, however, the religious condition of the colonists which demands the most anxious attention of the government. With three acknowledged or established religions whose ministers are paid from the public purse, it requires a more than ordinary degree of prudence and wisdom in administering to each of the three sects—Romanists, Presbyterians, and Episcopalians—the monies in due proportions; and the great want of church accommodation for all classes, and of ordained pastors of the Church of England in particular, is the cause of thousands falling away into a most shocking state of irreligion and infidelity; and, unless liberal and efficient measures be adopted by both the Home and Colonial governments to extend the means of education and religious instruction, the consequences cannot fail to be most calamitous.

Here, as at Van Diemen's Land, the Governor, being a member of the Church of England, is complained of by those of that communion with being often obliged to give a more favourable decision to either of the other sects, in order to prevent the suspicion of an undue bias towards his own church; and the religious feuds are often carried so high between the Presbyterians and

1841. July. Episcopalians, that each party seems to do its utmost to prevent any advantage accruing to the other: thus every step towards improvement and extension of the one sect is strongly and bitterly resisted by its opponent, and these feelings of religious jealousy or rivalry have been sufficiently powerful to induce even good and pious men of various denominations of the Christian Church to oppose and withstand, and eventually frustrate, the endeavours of the benevolent and virtuous to supply sound religious instruction to many thousands of souls, because the good of the Church of England might be advanced by the measure. May we not hope that a period of calm reflection will eradicate these petty but pernicious feelings of rivalry, which tend only to retard and place a stumbling block in the way of those who are struggling forward in their Christian course?

The only excursion into the country which my engrossing duties admitted was a day's trip up the river to Paramatta, a distance of about fifteen miles. The Governor's official duties requiring his presence there, and being desirous to show me a little of the country, he kindly offered me a seat in his barge, which I gladly accepted, especially as I was very anxious to obtain a good comparison of our chronometers with the time of the observatory at Paramatta, whose longitude had been so well determined by Sir Thomas Brisbane, when he first established the observatory at his own expense; and also to make arrangements for measuring the dif-

1841. July.

ference of meridians between it and Garden Island, by means of rockets, and thereby secure an accurate determination of the longitude of the latter place, for the convenience of merchant vessels sailing from the port. Although in the depth of winter, I was much struck with the richness and varied beauty of the scenery on both sides of the river. Landing at a wharf a short distance below the town, I walked directly up to the observatory, and was engaged there with Mr. Dunlop, whilst the Governor transacted the business which had called him to Paramatta, during which time we were fortunate in obtaining several good transits of stars; and having agreed upon a plan of co-operation with Mr. Dunlop, about the rocket experiments, and after partaking of some refreshment prepared for us at government-house, I returned to Sydney with His Excellency in his carriage; the drive was far less agreeable and interesting than the row up the river, especially on account of the heavy rains that had lately fallen, having rendered the roads in some places almost impassable for carriages, except by the powerful aid of four good horses. The roads generally in the colony are much inferior to those of Van Diemen's Land, owing chiefly to the want of proper materials, which they have to bring from a considerable distance, and at a very great expense. The principal roads were, however, undergoing very extensive repairs at this time, which contributed in no small degree to their present bad condition.

1841. The following evening being favourable for our projected experiments, Mr. Smith was despatched to an intermediate station, called Bedlam, to set-off some rockets, as we considered it probable that we should see them more distinctly than if sent up at either of the extreme stations. The instant of each rocket's explosion was noted at both places, and, after several nights' observations, the results were brought into comparison, and found to differ only in tenths of a second; twenty-five were judged sufficient for the accurate determination. The mean difference of time obtained amounted to $55^s{\cdot}85$, and, taking the longitude of the observatory at Paramatta at $10^h\ 4^m\ 6^s{\cdot}25$, as given in the Third Part of the Philosophical Transactions for 1829, p. 16–29., would give for the longitude of the place of observation at Garden Island $151°\ 15'\ 31''{\cdot}5$ E.; and again applying the meridian distance between this place and the Ross Bank observatory, as given by the means of our chronometers, we find the longitude of the latter place from these data to be $147°\ 23'\ 40''{\cdot}7$ E.

We found after a few trials that the rockets sent up at Garden Island could be seen perfectly well from the Paramatta observatory, which rendered the night excursions to Bedlam unnecessary.

Although the general magnetometrical observations were complete by the 28th July, the weather was so unfavourable that the absolute determinations could not be obtained until the 2d of August, which day was also devoted to making such com-

putations as were necessary; and before night ab- 1841.
stracts of all the observations that had been made at Garden Island by the officers of the expedition were packed up and sent on board the Ruby, of London, for conveyance to England; by which vessel I also transmitted to the Lords Commissioners of the Admiralty a statement of the operations of the expedition up to the present time. The Ruby sailed the next morning; but we remained until the following day to finish our arrangements, take down and stow away the observatories, and make other necessary preparations for our departure.

July.

The mean variation of the compass observed on Garden Island, between the 21st and 28th of July, was 9° 57′ 19″ E., and the mean dip 60° 50′ 5″ S.

In the course of the afternoon Commander Crozier and I went to government-house, to take leave of Sir George and Lady Gipps, from whom we had experienced during our stay the greatest kindness and warmest hospitality, especially evinced by their leaving us perfectly at liberty to accept or decline their almost daily invitations, but always receiving us with a most cordial welcome whenever our duties admitted of our appearing at their hospitable mansion. And our expedition is indebted to the Governor, not only for every assistance that we required, but for the readiness he uniformly manifested in facilitating our pursuits.

We also took leave of our warm-hearted friends

1841. August. of the M'Leay family, and of several of the gentlemen of the Australian Club, who had done us the honour to invite all the principal officers of the expedition to a grand public dinner.

We dined, and spent our last evening at Sydney, with the Governor and a number of friends he had invited to meet us; and, on our return on board at night, we found the ships had been unmoored in the afternoon, and were in every respect ready to sail at daylight in the morning, if the light westerly wind which was then blowing should continue favourable.

Late at night Commander T. R. Sulivan arrived in a merchant vessel from the East Indies, he having been appointed by the Commander-in-Chief to fill the vacancy occasioned by the melancholy death of Commander Croker, of H. M. S. Favourite; and as we had every reason to believe that vessel to be in some of the ports of New Zealand, his opportune arrival gave me the pleasure of Commander Sulivan's company to the Bay of Islands, where I expected we should meet the Favourite.

August 5. A perfect calm in the morning, and the flowing tide, prevented our sailing so early as I wished; but a westerly wind springing up on the turn of tide at 11 A.M., we weighed, and made sail out of the harbour. At noon we were at sea, running with all sail before a favourable and freshening breeze. At 4 P.M., the light-house on the South Head bore E. by S., distant 20 miles, from which we took our departure, and shaped our course for

the north end of New Zealand, distant rather more than a thousand miles. 1841.

We were much surprised to find the temperature both of the air and of the sea rise very considerably on leaving the harbour: the air from 55° to 60°; the surface of the sea from 55° to 63° immediately outside the Heads, which latter temperature continued without variation as we increased our distance from the land, that of the air again falling as the night advanced.

We observed some vivid lightning in the S.E., and apprehended a change of wind, but in this we were fortunately mistaken, the strong westerly breeze prevailing, and carrying us rapidly forward on our course, so that by noon the next day we had run a distance of one hundred and fifty miles, and were, by observation, in lat. 33° 52′ S., long. August 6.
154° 8′ E., dip 62°·41, var. 9° 42′ E.; by which also we found that we had been carried by a current twenty-nine miles to the south, which may in some measure account for the increased temperature of the sea above mentioned. At night, the Terror falling far astern, rendered a reduction of sail necessary, to our great mortification, as we had been struggling hard the whole day to keep a-head of a merchant ship which sailed some hours after us from Sydney, and which we now observed going fast past us, under comparatively easy sail; but our vessels were very deeply laden, considerably below their bearings, having completed to three years' provisions, stores, and fuel, at Sydney; so

1841. that, although carrying a heavy press of sail, we could not get them to go more than eight knots. We saw no birds during the day, a circumstance to us of unusual occurrence, but which reminded us of the low latitude in which we were sailing. Towards evening, the wind veered to the northward, and throughout the day we had several heavy showers of rain.

During the night we were obliged to reduce our sail to topsails and foresail, to enable the Terror to close, which she had hardly accomplished by day-light, when all sail was again made, the wind

Aug. 7. having backed from the N.W. to the S.W. At noon, we had run one hundred and sixty miles during the last twenty-four hours, and had been carried ten miles to the southward by the current. The change of wind had produced an awkward cross sea, which, together with frequent sharp squalls, occasioned us the loss of a few studding-sail booms; but this was of no consequence, as we were going to a country where the finest spars in the world for the purpose could be obtained without trouble or expense; but we were much surprised to experience such heavy squalls at so great a distance from any land.

Aug. 8. At noon we were in lat. 33° 27′ S., and long. 160° 43′ E., having run a distance of one hundred and sixty-three miles. We found the current to-day had carried us ten miles to the northward, so that it would appear that the breadth of the belt of warm water which runs along the eastern coast of

New South Wales to the southward, at the rate of 1841.
about twenty miles a-day, whose influence we had felt for the two previous days, does not much exceed three hundred miles. The temperature of the surface had sensibly changed since noon yesterday, from 64° to 61°; that of the air remaining steady at 59°. The Cape pigeon and sooty albatross were again seen this afternoon, as also were several flocks of flying fish—one of these creatures flew on board. In the evening, and throughout the night, observers were placed in different parts of the ship, to watch for the occurrence of falling stars, which might be expected to take place about the middle of this month. As the thorough accomplishment of this object required the aid of more observers than we could muster amongst the officers, even with the assistance of the civilians, who were ever ready to help on these occasions, it was necessary to train some of the more intelligent and careful of the seamen of each watch to this duty; and their report of the number seen in the division of the heavens to which their attention was directed was made to the officer of the watch at the end of every half-hour. One of the more zealous of these observers, who had not been so fortunate as to see any "falling stars" during his first half-hour, did not wish to leave his post when relieved, "as he was sure two or three would fall in a few minutes; he had been watching them, and could see they were shaking!"

At 1 P.M., in lat. 33° 40′, long. 164° 18′, we Aug. 9.

1841. tried the temperature of the sea: at three hundred fathoms it was 49°·7; at one hundred and fifty fathoms 55°·8, and at the surface 59°, the specific gravity being 1·0274 at 60°.

Aug. 9. Three sperm whales were seen, also a few flying fish, sooty albatross, and cape pigeons. At 8·20 P.M., "a bright meteor was observed to burst in the S.W., at an altitude of 20°, exhibiting a shower of beautifully variegated stars." It was also noticed on board the Terror, and is more circumstantially described in her log-book:—"At 8·20, observed a brilliant meteor emerge from a dark cloud near the southern cross, at an altitude of 10°; it rose to the altitude of about 25°, and in descent showed five bright lights." Fifteen falling stars were seen between 10 and 11 P.M., at which time about one half of the hemisphere was obscured by clouds.

Aug. 10. The wind had gradually declined during the morning until 9 o'clock, when, being very nearly calm, I took the only opportunity we yet had of trying the new self-registering thermometers that had been made at my request to stand a much greater pressure than those we had been at first supplied with, and which could never be safely sent to a greater depth than five hundred fathoms. We hove to at 9h. 20m. in lat. 33° 41′ S., long. 166° 23′ E., and tried for soundings with 820 fathoms, but without striking the ground. The temperature of the sea at 750 fathoms was 40°·4; at 600 fathoms, 42°·7; at 450 fathoms, 45°·6; at 300 fathoms, 49°·5; at

150 fathoms, 53°·6; at 100 fathoms, 56°·7; at 50 fathoms, 57°·6; at 2 fathoms, 58°·7; and at the surface, 59°·7: the new thermometers agreeing very satisfactorily in their indications with those we had formerly used, when sent down together to several depths less than 600 fathoms. From these experiments it would appear that the mean temperature of the ocean was not attained; and for this purpose it would be necessary to descend below 800 fathoms in this latitude. The temperatures obtained at the several different depths were in each case about a degree higher than those taken in the same parallel in the Atlantic, and differing to very nearly the same amount from some obtained by Sir Edward Belcher in 32° 46′ N. latitude, and 152° W. longitude, and of which he kindly furnished me an account, when I met him at the Cape, in April, 1843. The following table will show the comparison at these three widely different positions. 1841.

Aug. 10th, 1841. Lat. 33° 41′ S. Long. 166° 23′ E.	Mar. 1st, 1840. Lat. 33° 23′ S. Long. 7° 41′ E.	Sir E. Belcher's Experiment. Lat. 32° 46′ N. Lon. 165° 53′ W.	Mean of all. Lat. 33° 27′
Fath. ° ′	° ′	° ′	° ′
750 — 40 4	— — —	— — —	40 4
600 — 42 7	41 7	43 3	42 6
450 — 45 6	43 0	43 2	43 9
300 — 49 5	47 4	48 1	48 3
150 — 53 6	53 2	52 7	53 2
100 — 56 7	56 0	55 7	55 8

We were at the time of these experiments about two hundred and seventy miles from the islands called the Three Kings, off the north end of New Aug. 10.

1841. Zealand, which was the nearest land, and at so great a distance could hardly be supposed to have exercised any influence on the temperature of the sea.

In the afternoon we had light, variable winds from the S. E., accompanied by sharp squalls and showers of rain: many different kinds of marine animals were taken in the net, which the light breeze admitted of our towing astern, and it was interesting to recognize amongst them several of the same species with those we had taken in the tropical regions of the Atlantic. A large shoal of porpoises, and some immature albatross, were also seen.

Aug. 11. At 10 A.M. we struck soundings in four hundred fathoms, on a bank of sand and small black stones; the dredge was put overboard, and after dragging along the ground about half an hour it was found to contain some beautiful specimens of coral, corallines, flustræ, and a few crustaceous animals. The freshening breeze prevented our obtaining a larger number of specimens. The position of this bank is in lat. 33° 32′ S. long. 167° 40′ E., and about two hundred and twenty miles N. 80° W. from the Three Kings. The discovery of a coral bank rising from so great a depth towards the surface of the ocean, and probably in future ages to form an island between New South Wales and New Zealand, is a remarkable circumstance; and a careful determination of its exact size and the smallest depth of water over any part of it, by which means its annual

growth might be hereafter ascertained, would have been desirable; but our present object did not admit of our bestowing so much time on the investigation as it would have required. The temperature of the sea at different depths over this bank were as follows: at four hundred fathoms, 45°·3; at three hundred fathoms, 48°·1; at two hundred fathoms, 51°; and at one hundred and fifty fathoms, 53°; which, when compared with those at corresponding depths obtained in the deeper sea yesterday, would seem to bear out the following remark extracted from the instructions prepared for me by the Meteorological Committee of the Royal Society.* 1841. August 11.

"As no sea can be supposed absolutely motionless, the presence of a shoal, by casting up to the surface water which, but for it, would have continued to sweep along at a greatly lower level with the general body of the current, must bring the temperature of the surface water into nearer correspondence with that below. In low latitudes the surface water is hotter than that below; and accordingly it is a general remark, that the temperature sinks as the water shoals, or even *in passing over banks whose depth is very considerable.* If this theory of the phenomenon be correct, the contrary ought to be observed in situations where the surface water is colder than that below, as it is known to be, under particular circumstances, in the polar seas." The subject is one of considerable interest

* Page 50.

1841. August. to the navigator, as the approach to land or shoal water is indicated by the thermometer, in many places, with a high degree of sensibility. A remarkable instance of this kind occurs off the west coast of Africa, of which an account is given in the first volume of this narrative.*

Stormy weather during the three following days prevented our trying for soundings to a greater depth than four hundred fathoms, at which we did not reach the bottom. The appearance of solan geese, numerous patches of seaweed, and a remarkable degree of phosphorescence of the water, indicated our approach to land. It was seen at 9 A.M. of the 15th, bearing S. E. At noon, in lat. 34° S. and long. 172° E., we had no soundings with three hundred and fifty fathoms; the Three Kings bearing from S. 50° E. to S. 8° E., distant between seven and eight leagues. The wind being fresh from the N. E., with a heavy sea running, we stood towards the islands on the port tack, but should not have weathered them, had we not been assisted by a strong tide to windward; between the principal of the three islands and the small islet at the N. E. extreme, we observed a reef of rocks just above water, over which the waves were breaking furiously. We could not discern any bay or harbour on the north side of the island, which Tasman named the island of the Three Kings, in allusion to the day (Epiphany) on which he is said to have cast anchor off it. From our ships it had the

* Page 34.

appearance of a wild unprotected rocky shore, but 1841.
the soundings were such as to leave no doubt upon our minds that he might have anchored under the lee of the island in perfect safety.

Having weathered the small north-eastern islet, and finding the soundings regularly diminish from sixty-five fathoms, on fine gray sand and broken shells, at 6 P.M., to thirty-five fathoms at 9 P.M., we stood towards the main land until that time, when we tacked off to the eastward during the darkness of night; the only land in sight being the high bold Cape Maria Van Diemen, of romantic association.

It was so designated by Tasman nearly two hundred years ago, after a young lady of that name, to whom he was attached, and whom he afterwards married; she was the daughter, or near relation, of Anthony Van Diemen, the governor of the Dutch possessions in India, a great friend of Tasman, and by whom the expedition he commanded was sent forth, having been fitted out under his immediate superintendence at Batavia.

This great navigator was, therefore, the discoverer of the North Island of New Zealand as well as of Van Diemen's Land. The recent alteration of the name of the latter place to that of Tasmania, whilst it has paid only a just tribute to his memory, will serve at the same time to perpetuate a name which occupies so honourable and proud a position in the history of nautical discovery.

The wind continuing moderate, and shifting to Aug. 16.
the northward, we tacked at 1·40 A.M., and

1841. sounded in sixty-three fathoms, gray sand and broken shells. At day-light we saw Cape Maria bearing S. by W. ½ W. (true), and Cape North was soon afterwards seen as we stood to the eastward. We now experienced squally weather as we closed the land, and the wind backing to the eastward we were unable to fetch along the coast, and were therefore employed during the rest of the day contending with the wind, but making very little progress towards our desired port, owing to the north-easterly swell which prevailed.

At noon Cape North bore S. 56° E. (true), distant about eight miles; the range of hills of which it forms the termination rises to the elevation of 1130 feet above the level of the sea; and a peaked mountain, bearing S. 10° W. attains nearly 1000 feet. The rest of the coast is of very inconsiderable height, seldom exceeding four to six hundred feet, and in some places so low as, at a distance, to give the appearance of a separation. At 5 P.M., we sounded in thirty-two fathoms, shingle and broken shells, Cape North bearing S. 71° W., between two and three miles distant. Beating along the coast, we found the soundings sufficiently regular to be a safe guide, even during foggy weather; but under such circumstances it is to be avoided if possible, the tides being strong and irregular, and the survey of the shores very imperfect.

Aug. 17. The wind continued adverse during the night, and the whole of the next day, so that it was not

1841. August.

until late in the evening that we arrived at, and hove to off, the entrance of the Bay of Islands, the night being too dark for us to attempt the harbour. A lighthouse on Cape Brett, Cape Pocock, or one of the outer islands of the bay, is a desideratum of the first importance to the trade of this place. Had the wind increased to a heavy gale, our ships would have been in a very dangerous position; as it was, we were not without much anxiety during the night; the rapidly descending barometer and general aspect of the weather gave but too evident symptoms of the approaching gale, and when day broke, the haze was so dense that we could not see the land; fortunately for us, a partial clearing of only a few minutes duration gave us a glimpse of the fine bold promontory called Cape Brett, with its pierced rock off it, by which it can be distinguished from all other headlands. We immediately bore away before the breeze, which had by this time increased to a gale, steering for Kororarika Point, which we got sight of through the fog and the rain, which was pouring down in torrents. Furling all our square sails, we ran before the wind, passing the anchorage of Kororarika, and, guided by the admirable chart of Captain Fitzroy, entered the narrows of the river Kawa Kawa, the ships stirring the mud up as they passed over the bar, on which there was rather less water than they drew, and anchored about a mile and a half from its entrance, at 10 30 A.M., in five fathoms—moored with the best

1841. August. bower to the N. E., and small bower to the S. W., with thirty-six fathoms of cable upon each; Point Omatta flag-staff bearing S. 56° E., Point Gore N. 3° W. We observed the American corvette Yorktown at anchor off Kororarika, when the fog and rain cleared away in the evening; and the next morning I had the pleasure of receiving a visit from her commander, Captain Aulick, when I was sorry to learn from him that, having fulfilled the purposes which brought him here, and finished the refitting of his ship, he intended to sail almost immediately for the Sandwich Islands.

Commander Crozier and I went to pay our respects to Mr. Fitzgerald, the only representative of the civil authority at this place. He had recently arrived from England, having been appointed to a high official situation, but at the request of the Governor was fulfilling the duties of chief magistrate at this place until a favourable opportunity should occur for removing with his wife and family to the new seat of government at Auckland. At this time he was residing in a wooden house that Governor Hobson had brought from England with him, and which had been put up on the lands purchased by him with the intention of establishing at this place the capital of the colony; but, to the great disappointment of the inhabitants of Kororarika, and the settlers in the neighbouring country, he very judiciously removed with all the government officers to a more eligible spot at the Thames, where the

city of Auckland was at this time in process of erection. Captain Hobson was unfortunately absent on an official inspection of the more remote settlements established by the New Zealand Company, so that I had no opportunity of paying my respects to him. From Mr. Fitzgerald I received every attention, and permission to place our observatories on any part of the government grounds we might think most suitable; but the spot we had selected in the course of a forenoon's pull along the shores of the river, belonged to the Missionaries of the Church of England, and he referred me to the Reverend Mr. Williams, formerly a lieutenant of the Royal Navy. We therefore called upon that gentleman at the Missionary establishment of Paihià, who immediately granted us the required permission: in the afternoon our observatories were landed, and in a few hours were ready to receive the instruments. 1841. August.

The spot I had selected for our observatories was on a low level point of shingle, not more than three or four feet above high water, upon the left bank of the river Kawa Kawa, close by a small stream, whose muddy banks at low water gave occasion to our sailors to call it the "muddy-muddy," and about a quarter of a mile from the place called by the natives, "Haumi," marked by a small cluster of trees, on the beach where the bodies of the French navigator, Marion, and his unfortunate companions, were devoured by the exasperated savages, who conveyed them from the scene of the massacre,

1841. August. first across the narrow neck of land to Kororarika, and thence in canoes to Haumi, where they could indulge their horrid feast in more security and without fear of interruption.

Capt. Fitzroy very justly observes, that this sad catastrophe is now known to have been caused by mutual ignorance of each other's language; the Frenchmen, not understanding that the spot was "*tabooed*," persisted in fishing there against the remonstrances of the natives, and endeavoured to maintain their intrusion by force.

With reference to the anchorage I had chosen for our ships, and in which I was guided chiefly by his remarks, he observes, that "the estuary, or arm of the sea, forms an excellent harbour for ships not larger than third-class frigates; or, to speak in a more definite manner, for those which do not draw more than seventeen feet of water. On each side the land rises to five or six hundred feet, sheltering the anchorage without occasioning those violent squalls, alternating with calms, that are found under the lee of very high land, over which strong wind is blowing. As far as I know, there are very few shoals or banks in the wide space which forms the inner harbour. A slight stream of current and tide runs outwards during about seven hours, and the tide sets inwards about five, though with still less strength." To his ample and interesting account of this part of New Zealand and its inhabitants, and to the numerous more recent accounts of this painfully interesting

country, which have been published by those who had better means of obtaining accurate information than I had, I must refer the reader, confining any remarks I may have to make to points bearing more immediately upon our own pursuits and the especial objects of our voyage.

1841.
August.

CHAPTER III.

Suggestions relative to Vaccination. — Communicate with Captain Aulick. — Hourly Observations. — Visits of Awara and Pomare. — Dissatisfaction of the New Zealanders. — Influence of the Missionaries. — Climate. — Meteorological Abstracts.

CHAPTER III.

THE magnetometrical and other instruments were landed this morning, and their arrangement and adjustment kept us all busily employed. Early in the morning the surgeon of the Yorktown came alongside with a message from Captain Aulick, acquainting me that the small-pox had made its appearance amongst his crew, and requesting to be furnished with a small quantity of vaccine matter, as that which they had brought from America with them was found to have lost its virtue. Unfortunately we had none to give them, nor could any be obtained from the medical officer at Kororarika; so that had this dreadful malady been taken by the natives, it is awful to think how terrible must have been the consequences, and the thousands that would have fallen victims to its virulence. If, as has been asserted, and I believe, proved, the vaccine matter which acts so powerfully as a preventive be merely the virus of the small-pox modified by the constitution of a cow which had been attacked by that disease, might it not be desirable, on its breaking out in a country where vaccine matter is not to be had, immediately to inoculate a cow with the small-pox, and thus obtain the best of all remedies? This question I must leave to be answered by those conversant with these matters; and if the suggestion

1841. Aug. 20.

1841. August.

bitterness, their great disappointment at the effects of the treaty of Waitangi, so that I did not consider it advisable to permit those officers to extend their researches to any considerable distance from the position we had taken up. And although it was necessary to despatch boats several miles up the river, for the purpose of obtaining the spars we required to replace those that had been carried away during our run from Sydney, as well as to increase our store, yet I thought it proper that they should be well armed and prepared to resist any attack which the natives seemed well disposed to make, whenever it could be done with any certainty of success, and also to entrust the conduct of those parties to one of the senior lieutenants: indeed, so strong was the impression upon my mind of the readiness of the natives to seize any favourable opportunity of regaining possession of their lands and driving the Europeans out of the country, that I always felt much anxiety during the absence of our people, although I could fully rely on the prudence and judgment of Lieutenant Bird, by whom they were chiefly conducted. No spars of the size and kind we wanted were to be had near to our anchorage: the demands of the numbers of whalers that in former years used to resort to this port to refit had completely exhausted the forests of the immediate neighbourhood; and Lieutenant Bird found it necessary to proceed to a considerable distance up the river before he could procure any. There he was

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obliged to purchase some of a chief named Awara who was quite prepared to resist their being cut down, as in former years, for only a trifling payment. But now, muskets, and these only, were required for the trees, and without them we should not have been able to have obtained a single spar, except by force, which in the then temper of mind of the "Maories" would have led to serious results. As soon as Awara found his demand for two muskets for the spars was agreed to, he became more civil and obliging,—pointing out the best trees, and the most easy mode of getting them to the water; for although of course our carpenters were of the party, the chief proved that his selection of the trees as they were growing, was invariably better than theirs, after being cut down. He returned with Lieutenant Bird to the ships to receive the promised payment, when it appeared that his two muskets meant a double-barrelled gun, which they all seemed most desirous to possess; but as those we had on board were the private property of the officers, who of course were most unwilling to part with them, Awara was at length well satisfied with two rifles and a complete suit of lieutenant's uniform, which the officers furnished him with, and which he immediately put on, to the amusement of our sailors, and his great delight. I have not seen his name mentioned amongst those who have been engaged in the recent hostile transactions in that neighbourhood, and may therefore hope the rifles have not been employed against our

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own countrymen; and as from his isolated position it would be his policy to be on good terms with the Europeans, he has more probably acted with our forces against the rebellious Heki.

Pomare, another chief, and one who has taken a very questionable, if not a traitorous part in these transactions, also visited our ships, to obtain his customary present of gunpowder and fire-arms, and especially rum, to which he had lately become so addicted as seldom to be seen sober. He had, however, been on all former occasions very friendly to Europeans, and was of material assistance to Governor Hobson, on his first arrival in the colony, for the purpose of taking formal possession of it, in the name of Queen Victoria, and was not only amongst the first to sign the treaty of Waitangi, but was mainly instrumental in inducing many other chiefs, of far greater importance than himself, to do so. He was, therefore, entitled to more than ordinary consideration, and was received on board our ships, when he paid his first visit of ceremony, in all due formality. He did not appear in his usual state, the war-canoe and war-dance were laid aside on this occasion, and he had evidently drunk more rum than was quite consistent with his assumed gravity and dignity. His favourite wife also seemed to have shared his libations, and was therefore equally unfit to sustain the queenly part she endeavoured to perform. In one of her unguarded moments, whilst giving way to her extreme delight on looking over some

glittering toys that I had selected as a present for her, she recognised a portrait of our most gracious Queen, which was in my cabin, and immediately resuming a most ridiculous air of dignity, walked up to it, and holding out her copper-coloured hand, said, "Yes, all same as me — Victoria, she queen, — me queen too." Pomare was well pleased with some carpenter's tools I presented to him, instead of his customary present, and which I selected from a number of useful and ornamental articles which had been sent to me by my excellent friends, Mr. and Mrs. Beaufoy, for distribution amongst any natives we might meet with in the course of our voyage, and which I had now an opportunity of bestowing with great advantage to the natives, and felt much gratification in thus fulfilling the intentions of those benevolent and kind friends. 1841. August.

Pomare complained in strong terms of the treaty to which he had been so instrumental in getting his countrymen to become parties. He had not supposed that it was intended to deprive him of the power of selling his land to whoever he pleased; and although they all clearly understood that the treaty of Waitangi bound them to give the Queen's government the first offer of any portion of their lands they wished to sell, yet he expressed himself highly indignant at the thought that, if his offer were declined by the governor, no private individual could become the legal owner of it; thus, in fact, depriving him of the independent use

1841. August.

of his own property. Those also who had sold much of their land, years ago, for a comparatively trifling consideration, bitterly repented their having done so now, when they perceived how greatly it had increased in value; and although fully acknowledging the just right of the present possessors, yet they would, no doubt, be glad of any pretext to join any party they thought strong enough to drive the Europeans out of the land; and thus regain possession of it by right of conquest.

The introduction of custom-house and other dues, which had been the means of preventing the southern whalers from refitting in the Bay of Islands, and trading with the natives, was considered by those living in the neighbourhood of the bay a great grievance, as it deprived them of their best customers. The whale-ships that were accustomed to get all their supplies in the harbours of New Zealand, so much more convenient to them from being so near to their principal fishing places, are now obliged to seek refreshments, and supply all their wants, at some of the islands of the Polynesian group.

These were the chief causes of complaint that I heard at the time of our visit; and it was evident that, in consequence of the measures which had so immediately followed the signing of the treaty of Waitangi, it began to be regarded with very different feelings, not only by the generality of the natives, but also by some of the most powerful of their chiefs, who gradually became more and more

doubtful of the advantage of their altered position as they found their power and influence fast passing away into the hands of the settlers, who had flocked from England to this misrepresented colony in thousands, and established themselves in several parts of the northern island. It could not escape the jealous vigilance of the chiefs that the numbers of Europeans were increasing so rapidly that they would soon outnumber themselves, and gain possession of all their lands. Some of the chiefs had already called together large meetings of the natives, under the pretence of a feast, and had harangued them on the subject, especially calling upon them not to sell their lands to the Pakehas (or strangers); and at a sale of land which took place at Auckland, whilst we were at the Bay of Islands, I understood that some of the chiefs attended the auction, and actually re-purchased some of the land they had previously sold. No acts of violence had yet been perpetrated, and the rights of the present possessors of the land had hitherto been perfectly respected; but it cannot be denied, even by the most inveterate maligners of the missionaries, that this forbearance on the part of the natives was mainly due to the influence and persuasion of these good and pious men, who, having endured so much privation and hardship in their zealous endeavours to diffuse amongst the heathens the blessings of Christianity and the knowledge of the Gospel, were much looked up to by them for their advice on all occasions, and for whom,

1841. Sept. 2. therefore, they very naturally feel the greatest affection and regard.

H. M. S. Favourite arrived early this morning, when Commander Sulivan went on board, and superseded Lieutenant Dunlop, who had been acting commander of her since the death of her lamented captain. He was at this time suffering so much from the severe wounds he had received in that unfortunate affair which deprived the service of one of her most gallant officers, that it was necessary for him to proceed to England for the restoration of his health. He was accordingly invalided the next day, and returned to Auckland, where a ship was lying in readiness to sail for Sydney, and thence to England, which afforded me a favourable opportunity of sending despatches to the Secretary of the Admiralty.

Our magnetometric and pendulum observations proceeded to our entire satisfaction; but as these are now in course of publication, at the expense of government, and will shortly appear in a complete form, under the superintendence of Colonel Sabine, I need not here make any further allusion to them. But as any information respecting the nature of the climate of this newly-colonised country cannot fail to be useful, and as the importance of meteorological inquiries appears hitherto to have been wholly overlooked or neglected, I may hope, by inserting here a monthly abstract of the observations made on board our ships during the three months they were at anchor in the River

Kawa Kawa, to contribute in a small degree 1841.
to the beginning of an inquiry which, if carried August.
out for a few years, must prove of great advantage to the settlers in the management and improvement of their farms; for every one must be aware how intimately connected the various states of the atmosphere, and the consequent changes of weather, are with all the more important operations of the agriculturist.

The following tables are founded on observations of the temperature of the air and surface of the sea, the height of the barometer, the direction and force of the wind, and the state of the weather recorded every hour during the whole period, and are divided into equal intervals of about thirty days each, for the convenience of reference as well as of comparison with similar observations made in England, by which our emigrants will more readily perceive the change of climate they will have to make allowance for in all their pastoral and agricultural proceedings in their newly-adopted country.

The first table comprises the result of each day's observation between the 19th of August and the 17th of September; the mean of which corresponds more nearly with the 2nd of September, which may be considered equal to March of the northern hemisphere, and therefore, according to the most natural division of the seasons, is the first month of Spring. The mean temperature of the atmosphere is 53°·9, and the range of temperature during the period was 66° to 39°. In Eng-

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ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS, AT NEW ZEALAND, FROM THE 19th AUGUST TO THE 17th OF SEPTEMBER.

Date.	Temperature of Air in Shade.			Mean Temperature of Sea at Surface.	Barometer.			Wind.		Weather.
	Max.	Min.	Mean.		Max.	Min.	Mean.	Direction.	Mean Force.	
Aug. 19	61	46	52·9	55·6	30·189	30·124	30·158	S.S.W.	0·6	6 b.c. *
20	60	41	51·0	54·3	·214	·127	·172	S.S.E.	0·3	6 b.c.
21	63	40	51·5	55·2	·150	29·977	·059	S.W.	1·0	6 b.c.
22	57	46	51·8	54·9	·098	·951	·015	S.S.E.	1·0	3 b.c.
23	60	45	52·3	54·7	·160	30·096	·126	S.S.W.	1·0	4 b.c.
24	62	46	53·7	55·0	·127	29·963	·056	S.W.	1·1	5 b.c.
25	64	50	54·7	55·8	29·952	·798	29·893	West.	1·0	4 b.c.
26	59	47	52·6	55·1	·803	·673	·721	West.	1·5	3 b.c.
27	60	46	51·4	54·6	30·108	·791	·961	W.S.W.	1·2	4 b.c.
28	66	45	54·6	56·4	·193	30·018	30·119	West.	0·7	4 b.c.
29	63	51	57·2	57·0	·072	29·803	29·925	N.W.	3·2	0 g.
30	61	43	52·6	55·1	·248	·918	30·113	S.W.	1·8	5 b.c.
31	63	39	49·4	55·3	·277	30·193	·239	S.W.	0·7	3 b.c.

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Sept.										
1	61	41	50·7	53·9	·287	·219	·258	S.S.E.	0·2	3 b.c.
2	64	40	50·7	54·0	·336	·275	·301	S.E.	0·6	5 b.c.
3	58	47	51·5	55·2	·453	·344	·392	S.E.	0·5	0 g.r.
4	64	44	52·4	55·3	·455	·427	·442	N.N.E.	0·6	6 b.c.
5	64	43	52·9	56·1	·437	·367	·412	North.	0·9	6 b.c.
6	62	43	53·2	55·4	·374	·233	·316	N.N.E.	1·7	4 b.c.
7	62	55	57·0	56·6	·216	·084	·133	N.E.	4·7	0 g.q.r.
8	58	56	56·3	57·0	·109	29·926	·030	North.	3·5	0 g.r.
9	68	51	57·9	57·2	29·931	·816	29·868	N.W.	1·4	4 b.c.
10	64	46	55·1	56·5	·864	·766	·816	N.W.	1·0	4 b.c.
11	65	51	56·5	57·4	·956	·762	·835	W.S.W.	1·5	4 b.c.
12	65	48	55·8	56·9	30·066	·965	30·021	N.N.W.	0·5	4 b.c.
13	65	44	55·0	57·8	·089	30·007	·038	North.	1·0	4 b.c.
14	65	56	60·3	59·2	·017	29·805	29·930	N.N.W.	2·8	2 b.c.
15	60	55	58·2	58·5	29·795	·354	·522	North.	4·2	0 g.r.
16	60	48	54·0	56·8	·564	·312	·426	West.	2·9	2 b.c. 0 g.r.
17	60	46	53·5	56·0	·892	·588	·736	S.W.	1·3	4 b.c.
	66	39	53·9	56·0	30·455	·312	30·034		1·5	

* For the explanation of these symbols, see Appendix to First Volume.

1841.

ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS, AT NEW ZEALAND, BETWEEN THE 18th OF SEPTEMBER AND THE 18th OF OCTOBER, 1841.

Date.	Temperature of Air in Shade.			Mean Temperature of Sea at Surface.	Barometer.			Wind.		Weather.
	Max.	Min.	Mean.		Max.	Min.	Mean.	Direction.	Mean Force.	
Sept. 18	61	47	55·1	55·5	29·950	29·758	29·867	N.W. by N.	1·7	3 b.c.
19	62	43	52·0	55·4	30·160	·961	30·063	S.S.E.	0·7	6 b.c.
20	68	39	52·5	55·5	·161	30·011	·077	Westerly.	0·8	4 b.c.
21	64	50	55·3	55·8	·033	29·978	·009	Calm.	0·0	4 b.c. 0 g.
22	71	48	56·7	57·2	·131	30·005	·043	N.N.E.	0·5	4 b.c.
23	68	49	56·0	57·6	·223	·138	·180	North.	0·6	5 b.c.
24	65	44	54·1	58·0	·240	·153	·211	S.E.	0·6	6 b.c.
25	62	48	57·4	57·5	·321	·192	·249	East.	2·3	2 b.c. 0 g. q.
26	62	54	57·4	56·7	·390	·317	·356	East.	1·4	0 g.
27	65	54	58·0	57·1	·432	·386	·404	N.E.	0·4	0 g.
28	64	53	57·7	57·1	·436	·398	·417	Easterly.	0·7	0 g.
29	73	50	58·0	57·8	·445	·392	·421	North.	0·6	0 g. 4 b.c.
30	68	49	58·7	57·0	·419	·274	·342	N.E.	0·5	0 g. 2 b.c.

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Oct.										
1	63	58	59·6	57·6	·283	·066	·186	E.N.E.	2·5	0 g.c.r.
2	64	57	60·1	57·8	·049	29·835	29·918	N.E.	2·0	0 r.q.
3	67	58	62·0	59·6	29·885	·805	·852	N.E.	1·0	6 b.c.
4	63	51	58·9	59·2	·858	·707	·772	Northerly.	0·5	0 g.r.
5	65	46	55·7	58·3	·896	·805	·843	West.	0·7	5 b.c.
6	62	48	54·3	57·7	30·090	·899	·979	S.W.	2·0	5 b.c.r.
7	64	50	56·0	57·6	·220	30·089	30·115	S.W.	2·1	4 b.c.
8	66	46	56·3	57·9	·246	·181	·214	S.W.	1·1	6 b.c.
9	66	46	57·0	58·2	·193	·105	·152	S.W.	1·0	6 b.c.
10	67	51	60·2	58·2	·131	·093	·111	W.S.W.	1·6	4 b.c.r.
11	70	58	63·9	59·2	·126	·044	·094	W.S.W.	1·5	4 b.c.
12	64	50	56·3	59·5	·276	·133	·217	S.W.	1·1	4 b.c.
13	69	44	57·9	59·1	·236	·070	·142	West.	0·6	6 b.c.
14	68	52	60·0	59·6	·228	·136	·176	North.	1·0	4 b.c.
15	64	50	59·0	60·6	·251	·191	·224	N.N.W.	0·9	5 b.c.
16	67	53	61·0	61·5	·222	·136	·183	North.	1·0	f.g. 2 b.c.
17	67	60	63·0	61·1	·115	29·811	29·968	North.	2·1	4 b.c.r.
18	67	58	63·7	61·6	29·814	29·721	29·771	N.W.	1·1	4 b.c.
	73	39	57·9	58·1	30·445	29·707	30·1185		1·2	

1841. land, the mean temperature due to the middle of the month of March is 43°·9, and the average range is from 66° to 24°. The first month of Spring in New Zealand has therefore a higher temperature by ten degrees than that of England; and, although, the maximum temperature in both is the same, yet the climate of New Zealand is free from those severe frosts which frequently do so much mischief to advanced vegetation in England.

The mean temperature of the dew point, as derived from observations made four times each day, viz.; at 3^h and 9^h A.M., and 3^h and 9^h P.M., by Mr. Lyall, assistant-surgeon of the Terror, was found to be 49°·6; the amount of dryness is therefore 4°·3; the degree of moisture of the air is ·862; and the elasticity of vapour is equal to 0·395 inches. The quantity of rain which fell 11·76 inches, and the greatest fall occurred between 2 A.M. on the 8th, and 2 A.M. on the 9th September, amounting to 5·5 inches; the barometer during the time being below its mean height, and the wind fresh from the northward: so far, therefore, as regards the moisture of the atmosphere, there is very little difference between the first spring month of England and of New Zealand, the degree of dryness in England being 4°·9, the moisture of the air ·831, the elasticity of vapour ·272, but the quantity of rain amounts to only 1·44 inch.

The mean height of the barometer is 30·034, and its range 1·14 inch. The diurnal variations of pressure, commonly called the atmospheric tides,

occur at 9 A.M. and 10 P.M. when it is greatest, 1841.
and 4 A.M. and 3 P.M. when it is least; and the difference amounts to ·041 inch.

The mean temperature of the surface of the sea is 56°.

In like manner for the next month, the mean temperature of the air derived from the second table, which comprises an abstract of all the observations made between the 18th September and 18th October, an interval of thirty-one days, and correspond to the 3rd October, is 57°·9, — an increase of four degrees in the mean temperature of the month as the season advances, whilst that of England increases about six degrees. The range of temperature at New Zealand is from 73° to 39°; in England, in April, it is 74° to 29°.

The mean temperature of the dew point is 53°, making the amount of dryness 4°·9; the degree of moisture has consequently varied very little, being ·847, the elasticity of vapour, ·444, the quantity of rain, 4·1 inches. The greatest fall of rain during the period occurred between 5 P.M. and midnight of the 17th of October, amounting to 2·84 inches, the barometer being rather below its mean height for the season, and the wind strong from the northward.

The mean height of the barometer is 30·118, and its range ·738 inch. The greatest pressure occurs at 9 A.M. and 10 P.M., and the least pressure at 4 A.M. and 4 P.M.: the difference amounts to ·044 inch.

1841.

ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS AT NEW ZEALAND, FROM THE 19th OF OCTOBER TO THE 17th OF NOVEMBER, 1841.

Date.	Temperature of Air in Shade.			Mean Temperature of Sea at Surface.	Barometer.			Wind.		Weather.
	Max.	Min.	Mean.		Max.	Min.	Mean.	Direction.	Force.	
Oct.										
19	66	57	62·22	62·03	29·732	29·524	29·633	North.	2·63	4 b.c. 0.r.
20	66	57	62·67	62·80	30·063	·684	·901	N.W.	1·42	6 b.c.
21	69	61	65·35	64·10	·147	30·059	30·114	N.E.	1·12	5 b.c.
22	73	57	66·88	65·03	·117	·029	·074	N.E.	1·58	6 b.c.
23	70	57	64·26	66·28	·184	·100	·154	North.	1·38	3 b.c.
24	71	62	66·62	66·10	·138	·063	·095	N.W.	2·21	4 b.c. 0 g.r.
25	71	57	64·50	66·22	·196	·085	·122	S.W.	1·00	5 b.c.
26	68	51	60·62	65·64	·239	·174	·203	North.	0·96	6 b.c.
27	66	52	61·70	64·26	·160	29·885	·032	N.N.E.	2·29	4 b.c. 0 g.r.
28	62	51	57·08	63·29	29·855	·670	29·738	N.N.E.	2·04	0.g.r. 8 b.c.
29	68	50	59·74	62·98	·790	·685	·722	S.S.W.	0·71	5 b.c.
30	73	55	62·96	63·76	·851	·785	·815	West.	1·42	4 b.c.
31	69	58	63·70	63·34	·903	·783	·834	S.W.	2·51	5 b.c.q.

1841.

Nov. 1	68	53	61·30	62·42	·949	·863	·902	S.W.	1·67	4 b.c.p.
2	64	51	57·00	62·02	30·026	·955	·981	North.	0·71	4 b.c.p.
3	69	49	58·17	61·32	·090	30·026	30·055	S.W.	1·08	5 b.c.
4	65	47	57·30	60·72	·106	29·990	·043	N.W.	1·71	5 b.c.q.
5	69	59	62·50	60·82	29·963	·818	29·918	West.	1·75	0 r.—3 b.c.
6	67	54	59·47	60·46	·976	·855	·902	S.W.	1·78	3 b.c.
7	66	50	59·62	61·26	20·048	·975	30·017	N.W.	0·79	5 b.c.—0 r.
8	64	53	59·50	60·34	0·29	·923	29·972	North.	1·33	0 g.r.
9	68	51	54·67	60·19	0·24	·965	·999	W.S.W.	1·00	5 b.c.
10	65	51	58·70	61·52	·001	·885	·940	S.W.	1·00	4 b.c.p.
11	74	52	62·00	60·72	29·967	·865	·915	South.	1·26	6 b.c.
12	68	51	60·22	61·10	·900	·832	·873	S.W.	0·50	4 b.c.p.
13	65	54	60·57	61·29	·902	·804	·855	North.	1·08	4 b.c.
14	66	51	58·13	61·22	·842	·495	·678	S.W.	1·21	3 b.c.r.
15	59	50	54·00	60·07	·452	·141	·245	W.N.W.	1·71	2 b.c.r.
16	65	51	56·07	59·42	·712	·281	·527	S.W.	2·58	3 b.c.q.r.
17	68	49	56·70	59·32	30·010	·725	·870	S.W.	1·79	5 b.c.
	74	47	60·47	62·33	30·239	29·141	29·904		1·47	

1841. The mean temperature of the surface of the sea is 58°·1.

The third table is also derived from all the observations made between the 19th of October and 17th November, an interval of thirty days; the mean temperature corresponding to the 3rd November has advanced two-and-a-half degrees, to 60°·5, and its range is from 74° to 47°. In England the mean temperature for May is 54°, and its range from 70° to 33°.

The mean temperature of the dew point is only 52°, showing that the atmosphere has attained a greater degree of dryness, being 8°·5; the moisture of the air is therefore reduced to 0·735. In England, we also find, that in May, the temperature of the air still outstrips the advance of vapour, and the atmosphere attains very nearly its state of greatest dryness; the mean temperature of the dew point being 46°·1; the degree of dryness is 7°·9, and the state of saturation, ·769. The elasticity of vapour in New Zealand is 0·428; in England, 0·354 inch.

The quantity of rain in New Zealand, 9·5 inches, and the greatest fall occurred on the 8th November, between 4 A.M. and 6 P.M. 2·1 inches, the barometer being about its mean height, and the wind from the north. In England the quantity of rain in May is only 1·85 inch.

The mean height of the barometer is 29·904, and its range 1·80 inch. In the diurnal tides the times of greatest pressure are 9 A.M. and 11 P.M.,

and of least pressure, 4 A.M. and 4 P.M.; the differ- 1841.
ence is 0·032 inch.

The next table contains a summary of the condition of the atmosphere during the three months of the spring season; and that which follows, derived from Mr. Daniell's Essay upon the Climate of London, is inserted here for the sake of comparison.

NEW ZEALAND.

	Temperature of the Air.			Mean Dew point.	Drying.	Saturation.	Rain. Inches.	Elasticity. Vapour.	Mean Barometer.
	Max.	Min.	Mean						
1 Month	66	39	53·9	49·6	4·3	·862	11·76	·395	30·034
2 ...	73	39	57·9	53	4·9	·847	4·10	·444	30·118
3 ...	74	47	60·5	52	8·5	·753	9.50	·428	29·904
	74	39	57·4	51·5	5·9	·817	25·36	·422	30·019

ENGLAND.

	Temperature of the Air.			Mean Dew point.	Drying.	Saturation.	Rain. Inches.	Elasticity. Vapour.	Mean Barometer.
	Max.	Min.	Mean						
1 Month	66	24	43·9	39	4·9	·831	1·44	·272	29·843
2 ...	74	29	49·9	43·5	6·4	·783	1·79	·322	·881
3 ...	70	33	54	46·1	7·9	·769	1·85	·354	·898
	74	24	49·3	42·9	6·4	·804	5·08	·316	29·874

The mean temperature for the year in England is 49°·2, which differs very slightly from the mean temperature of the three months of spring. It is not at all improbable that the mean temperature

1841. for the year at New Zealand may likewise not differ greatly from that of the spring, and would be rather more than the mean of the above three months, as their respective means refer to the 2d or 3d, instead of the middle day of each month. It will, therefore, probably prove to be about 59°, or ten degrees above that of England.

But we have another mode of arriving at the mean temperature, without apprehension of any considerable amount of error.

In accordance with my instructions, and with the view to collect facts relative to the distribution of temperature on land, five pairs of self-registering thermometers, after having been carefully compared with the standard, and their corrections accurately determined, were packed in vessels, and, after being well covered with non-conducting substances, were buried in the earth at the depths of one, three, six, nine, and twelve feet, on the 18th of October, and were allowed to remain there until the 12th of November following, so as to ensure their acquiring the precise temperature of the soil; and the mean reading of the two thermometers, when corrected at each of the several depths, was as follows:—

At 1 foot	below the	surface was	61° ·5
3 feet	"	"	60 ·9
6 "	"	"	60 ·65
9 "	"	"	59 ·76
12 "	"	"	59 ·42

The temperature of water in a well at Waimati, thirty-five feet deep, but with only six feet four

inches of water in it, was 58°·8. From these facts 1841.
we may be led to conclude the mean temperature for the year will be found to be very nearly 59°.

This is, however, a point of considerable importance to have determined accurately, and the observations should be continued throughout several years before this can be accomplished. In looking over the hourly observations that were made by the officers of the Erebus and Terror, during the ninety-one days from which the above results have been obtained, I perceive that the mean temperature for the whole period would have been arrived at with very great accuracy by a single daily observation, either at 8·30 A.M. or 7 P.M.; and I doubt not the mean temperature for the year could be ascertained to within very small limits of error, by a regular register of the temperature at either or both of those hours, as might best suit the convenience of observers.

Besides the great difference of ten degrees of temperature, the quantity of rain which fell during the above interval, exactly five times the amount which falls in the spring, and three inches more than falls during the whole year in England, is very remarkable, and well deserving the attention of the agriculturist.

It is true this quantity differs materially from that given by Dr. Dieffenbach, being more than double the amount of that which fell during the same months of the same year at Port Nicholson; and he further states, that the whole quantity

1841. which fell there between April, 1841, and February, 1842, was only 34·49 inches; from which he draws the conclusion that New Zealand has a rainy climate, and may be ranked in this respect with several places in England.

It certainly proves, as might have been anticipated, that a much greater quantity of rain falls at the northern than at the southern parts of the island; for the heaviest falls of rain occur during northerly winds, which come from the equatorial regions, fully charged with moisture, of which a large proportion is precipitated as it passes over the first land it meets.

Dr. Dieffenbach states the mean temperature of the whole year at Wellington to be 58·2, and the mean temperature of the three months of spring 57·7, a remarkable accordance with the results and inferences obtained from our observations at the Bay of Islands; and I can therefore with the more confidence quote from him the following table, showing the mean temperature of each month, which, although derived from only one year's observations, will probably be not far from the truth, in a climate which seems to possess an unusual degree of uniformity.

March	62°·5	September	53°·5
April	63 ·5	October	59 ·2
May	51 ·1	November	60 ·5
Autumn Quarter,	59 ·3	Spring Quarter,	57 ·7
June	51°·3	December	64°·7
July	48 ·7	January	66 ·4
August	51 ·2	February	64 ·8
Winter Quarter,	50 ·4	Summer Quarter,	65 ·3

These results, for the convenience of comparison, I have arranged according to the order of the season, and it will be perceived that the mean of the winter and summer quarter, or that of the autumn and spring quarter, does not differ half a degree from the mean temperature of the year. The coldest month is July, the hottest January,—the difference of their mean is only 17°·7; whilst in England, that of the correspondent months amounts to twenty-five degrees. 1841.

At Auckland, which is not more than a hundred miles to the south of the Bay of Islands, the mean temperature of the year is 59°, that of the three summer months, 67°·2, and of the three winter months, 52°, their difference being only 15°·2, and their mean six-tenths of a degree above that of the mean annual temperature.

Sketched by Dr. Hooker.

Catching the Great Penguins. Page 159.

CHAPTER IV.

Aspect of the Country. — Visit to the Missionary Station of Waimati. — Falls of the Keri Keri. — Kaudi Gum. — Heki's Pah. — Heki's Feast. — Waimati. — Fishing Party to Lake Mapere. — Ascent of Puki Nui. — Lakes at Taiami. — Hot Springs of Tuakino. — Return to the Erebus. — Visit from Captain L'Eveque of the French Corvette, Héroine. — Capture of the French Whaler, Jean Bart, by the Inhabitants of Chatham Island. — Necessity for increased Naval Force in these Seas. — Tidal Observations.

CHAPTER IV.

The total absence of roads through the country, and the uncertain state of feeling towards Europeans which the natives had begun to manifest, prevented our officers from penetrating to any considerable distance into the interior; the native paths through the woods and swamps being quite impracticable without the assistance of guides, and under existing circumstances it was hardly safe for any Europeans to place themselves so completely in the power of the natives, who might, at any time, leave them in a situation from which it would be utterly impossible to extricate themselves, or find a way through the perplexing labyrinth in which they might become helplessly involved. 1841.

Fortunately our occupations demanding our attention so constantly, prevented our feeling any regret that the nature of the country opposed so serious a barrier to any researches we might have desired to make, for nothing could be more uninviting than its appearance from the ships and the neighbouring hills; the gently undulating surface covered almost entirely with fern, gave it an uniformity and sterility of aspect which the few clumps of trees, with which it was varied, served only to render the more remarkable, whilst the thickly interwoven underwood made travelling

1841. through the high fern groves extremely tedious and laborious.

As soon as the pendulum experiments, which had wholly engaged my time until the end of October, were completed, I availed myself of the kind invitation of the Reverend Mr. Taylor to visit the agricultural establishment and school at Waimati, belonging to the Church of England mission, at that time under his care, and which I was very desirous to see, on account of the well-known and highly-interesting accounts which have been given by earlier visitors to New Zealand of that valuable establishment for the improvement of the agricultural, as well as religious, condition of the natives.

Accompanied by Commanders Crozier and Sulivan and Lieutenant Bird, I left the Erebus in charge of Lieutenant Sibbald, at noon, on the 1st of November; the morning was beautifully fine, and perfectly calm, until 6 A.M., when an unfavourable change took place as we entered the river "Keri Keri," (pronounced Kiddi Kiddi,) a fresh opposing wind sprung up with occasional heavy showers of rain and violent squalls, as if to remind us of the appropriate name of the river, "Keri," meaning boisterous. After pulling for three hours against the breeze, but favoured by the tide, we gained the missionary settlement, near the lower falls of the Keri Keri, where it divides into two branches, without our boat grounding upon any of the sandbanks with which it abounds.

The establishment here consists of a spacious strong-built stone warehouse, in which the stores and merchandise belonging to the missionaries are kept in safety. It is situated in one of the prettiest spots of the country, though entirely bare of wood, except only a few peach, pear, apple, and other fruit trees in the garden belonging to the house, and at the highest point of the river to which vessels can ascend. 1841.

We were very kindly received by Mr. Kemp, the schoolmaster, the only European resident at the place, and who had been a great many years in the country. He had heard of my intended visit, and had a guide ready to take us to the upper falls, which he told us were well worthy of our attention. Whilst our people were making preparation for our march to Waimati, we crossed to the opposite bank of the river, not exceeding twenty or thirty yards wide: the shore rises abruptly from the water about seventy feet, and after gaining the level country, covered with short fern, and heath-like plants, but totally destitute of trees, we walked above a mile and a half before we reached the falls. Their first appearance is very striking, the rapid stream which the eye may trace winding several miles along the extensive plain, precipitates a broad sheet of water over an escarpment of black basaltic columns about seventy feet high into a deep circular basin, whose shores are thickly wooded. A narrow winding path enables you, without difficulty, to descend to its margin, and

1841. however beautiful the effect is in looking from above into the depth below, the fall is seen to much greater advantage from beneath. The height and volume of water which is projected over the cliff, roaring and foaming, contrasts strongly with the black columns and the varied foliage of the dark green Coprosma, the lighter glaucous Lauri, and other trees which derive freshness and vigour from the constant supply of moisture from the thin mist that always fills the valley. The basin appears to have been worn to a considerable depth, as is also the narrow channel which conveys the pure and bright water from it to the sea.

Some of our officers who visited these falls passed under them, between the volume of water and the vertical columns, where the much-lamented Cunningham is said to have collected several very curious plants. We could not afford time to do so. I am therefore the more glad to avail myself of some notes by Mr. M'Cormick on the curious cave he examined, and some other geological and general remarks made during his several short excursions into the country which will be found in the Appendix. When Dr. Hooker visited these falls, the day was bright, and he was much struck with the great difference of temperature, as measured by the feelings, on descending from the plain, where he stood exposed to the full force of the sun's rays, into the damp woods from which they are entirely excluded; he also described a phenomenon, which, though common to waterfalls, here produces

a remarkable effect; when the sun shines brightly a beautiful rainbow of intensely brilliant colours, spans the dark abyss, mingling its bright hues with the rich foliage of the encircling banks. 1841.

We returned to our people, who had, during our absence, got all ready for our journey; the boat's crew of eight men, carried our tents, blankets, and a small flat punt, constructed of bullocks' hides by Lieutenant M'Murdo, for duck shooting over the mud flats up the Kawa Kawa, very light and capable of carrying two men in smooth water. As one of our purposes was to fish an extensive lake near Waimati, I thought it would be useful, and a larger boat would have been too heavy for our party to manage. Mr. Taylor had sent a horse to carry our small-sized seine, but the animal was so restive that we found it impossible to fix this novel kind of burthen on his back, and were obliged to leave it to be sent for after our arrival at Waimati.

The unusual appearance of our party, the officers in advance with their double-barrelled fowling pieces, specimen baskets, and various instruments for measuring the elevation and position of the several places we proposed visiting, followed by the crew carrying the boat and other necessary materials, on bearing poles, attracted the attention, and not unfrequently the ridicule, of the natives we met on our journey. We kept along the main road nearly the whole distance. It is, indeed, the only thing that deserves the name of a road in New

1841. Zealand, and was formed by the missionaries a few years ago, for more ready communication between their two principal establishments: and at this time the greater part of it was in very good condition, so that a carriage might have been driven along it.

On ascending about two hundred feet rather abruptly from the river, we came upon a long tract of level country, covered with low stunted brushwood, amongst which many beautiful flowers were beginning to appear. The soil is extremely poor and unproductive; a large portion of the surface being occupied by reedy marshes, not more than one or two feet deep, lying upon dense clay. I was told that the whole of this extensive plain was at one time covered with an immense forest of Kaudi trees (Dammara australis), and the gum which exudes from them may be found in any part by digging for it. There are, however, no other remains of the trees to be found, from which circumstance it has been supposed that the forest was burnt down; a method frequently adopted for clearing the land when wanted for cultivation, and which would, in some measure, account for the gum being found in such very large pieces; in no other way can we explain how the gum should be there, and yet the absence of any trunks or roots of the trees, together with the extreme poverty of the soil, are facts barely reconcilable with the former existence of a large forest. It would be worth while to dig to a good depth at

some of the spots where the gum is found in the greatest abundance, for we may conclude from the resinous nature of the wood the fire might eat its way down considerably beneath the surface, and a knowledge of that fact would of itself be an interesting circumstance. The gum is an article of extensive commercial importance; it is purchased chiefly by the Americans at the rate of a penny the pound, but the purpose to which it is applied by them is still a secret. 1841.

For the first four or five miles the country was equally monotonous and sterile; although I have no doubt it might, under cultivation, be made good pasture land, yet it would require great labour, which is not to be obtained here, and without it no considerable improvement can be expected. The natives we met on the road generally greeted us with the friendly and cheerful salutation of the country, "Tene-ra-ka-koa," the equivalent to "How do you do?" or "good morning," and seemed greatly amused at our imperfect pronunciation of the word; in most cases they had a kind look and hearty shake of the hand ready for us; indeed this latter practice seems to have entirely taken the place of their former method of greeting by touching noses, as is still practised by the Esquimaux of the Arctic regions.

We had at that time little reason to apprehend that these apparently peaceful and happy people were so soon to feel all the horrors of war. Yet it was along this road that the brave little band of

1841. soldiers and sailors, under the gallant Despard, marched to attack the rebellious Heki, in his hitherto esteemed inpregnable Pah, distant between four and five miles from Waimati, which fell and was destroyed by the persevering bravery of our united-service force under his skilful command. It was fortunate for our brave countrymen they had a road by which to transport their artillery even thus far towards the scene of action; but I fear it will teach the "Maories" to erect their fortifications on situations inaccessible to cannon, by which alone they can be destroyed, as every attempt at scaling their outworks must inevitably end in disappointment and defeat.

We got the first sight of Waimati when at a distance of four miles from it, just before reaching the valley through which the river of that name flows. We crossed the stream by a neat wooden bridge, and at a short distance beyond we observed a most strange-looking lofty building or scaffolding, evidently erected with great labour, in a succession of terraces or platforms to the height of more than a hundred feet. It was situated close by a small native village, on a level space, surrounded by hills of small elevation, whose sides were thickly clothed with timber.

We were at a loss to conjecture for what purpose such a structure could have been erected; but we subsequently learned from Mr. Taylor, that it was built on the occasion of a great feast which was given by the now notorious Heki to a number of natives whom he had called together from all

parts of the island, when the several stages or platforms were loaded with various kinds of provisions, consisting of Indian corn, potatoes, sweet potatoes, pigs, cockles, and all kinds of eatables for their use, being placed there for safety; each platform being cleared off as required. 1841.

It is said that upwards of a thousand natives assembled at the feast, the principal object of which was to afford Heki* the opportunity of dissuading his countrymen from selling their lands to the English.

He had been converted to Christianity several years ago, is well acquainted with the precious truths of the Gospel, and exemplary in the discharge of all religious duties. He has ever lived on good terms with the missionaries, although he has never concealed his growing hatred to the invaders of his country. He is a turbulent, courageous man, possessing a remarkable mixture of cunning and frankness, all of which characters are occasionally expressed in his countenance, notwithstanding the tattooing which disfigures his features. Ever since this patriotic feast he has been regarded as the greatest enemy of the English. The whole of the provisions which were consumed during the week or ten days it lasted were purchased by Heki; but of which he, as is the custom of the country, did not partake; his

* These feasts, which are called "Hakari" or feasts of peace, are now of but rare occurrence, and not always devoted to their original purpose.

1841. part of the business being to mix with the different groups, addressing each in their turn, and seeing that they all enjoyed themselves. We could not help thinking that the provisions might have been equally well secured upon a less elaborate and expensive structure.

After crossing the river we observed a marked change in the geological structure of the country, from a sterile pipe-clay to a richer decomposed volcanic matter at the surface, densely compressed beneath, and mixed with mica, hornblende and quartz, which had perhaps at one time been a hard granite rock, and if exposed to great heat and pressure, might again become so. Ascending the steep hill on the opposite side of the valley the increased fertility of the soil was strikingly manifest, and on reaching its summit the neat-looking village, and the church with its conspicuous steeple, came in view ; the houses of the missionaries, built quite in the English style, together with the well-cultivated farms and fields, divided by hedgerows of true English green, formed a most gratifying sight, and reminded us more of our own country than anything we had seen in other parts of the colony.

We were received on our arrival, early in the afternoon, by Mr. and Mrs. Taylor in the most cordial manner, and after doing justice to an excellent dinner they had prepared for us, we walked through the gardens, in which we found abundance of delicious strawberries and other fruits of our own country mingled with those of the tropical

regions. The gardens were laid out with good taste, and, although convenience and usefulness had been more especially consulted, yet neatness and regularity of appearance had not been overlooked. To us it was most delightful to see in this far-distant land so great a variety of plants common to our own country, recalling many happy associations of by-gone days, and the exciting thoughts of future hope which arose in our minds were by no means the least pleasurable emotions we experienced as we wandered through these beautiful gardens. 1841.

It was a fine serene evening, and our observations for the position of this spot and its elevation above the level of the sea were satisfactorily accomplished. The temperature of the air was 70°·5, that of the water in a well fifty-six feet deep, but with only nine feet of water in it, was 59°.

As our absence from the ships was limited to a few days, Mr. Taylor kindly undertook to arrange our operations, so as to enable us to visit the several places we wished with as little loss of time as possible. There was the great lake to be fished; then to be crossed and sounded, and the deep fissures in the mountain on the opposite shore to be examined and fathomed; the highest mountain in the neighbourhood, Puki Nui, to be ascended, and its height determined; the large crater to be explored, and the hot springs to be visited. All these objects, of great interest to us, except the two former, were placed in different directions, and at a considerable distance from Waimati, and as all had

1841. to be accomplished on foot, because our instruments might sustain injury from the jolting of a horse, and were too valuable to be trusted to any other hands, it required all the consideration of some one well acquainted with the country, and with our powers of enduring the fatigue of travelling along the narrow native paths, to dispose of our time to the best advantage.

We agreed first to visit the Lake Mapere at Mawe, and having sent our people off early the next morning with the small boat and seine, we started at 9 A.M., and after half an hour's smart walking were obliged to take shelter from a very heavy fall of rain in a small neat chapel which the Christian natives had themselves built of wood in one of their stone pahs, and in which, Mr. Taylor informed us, one of the native schoolmasters read the church service twice every Sunday. Some of the cottages were remarkably clean and tidy, and their gardens, containing peach trees and the Cape gooseberry, in much better order than we had seen in other places. At a distance of five or six miles from Waimati, after passing through a difficult marshy jungle, we arrived at the edge of the lake.

It is a fine sheet of water, between two and three miles in diameter, or perhaps more, and thickly wooded to the water's edge. It is said to be very shallow, and there are many superstitious traditions regarding its origin, too idle and absurd to be mentioned; yet it seems certain that it covers the

sites of several native villages, whose names are spoken of as of no very distant date, and we have every reason to believe that the face of this land, and especially in this neighbourhood, has been much altered by volcanic disturbances, of which the extensive and numerous smaller craters, the cleft mountain, and the thermal springs are so many striking evidences. Although we were told that the lake is very shallow, yet on this point we may have been mistaken, as I perceive Dr. Dieffenbach, in speaking of it, says it is about one square mile and a half in extent, and apparently of great depth: in some places its borders are steep, and consist of basaltic lavas. It is, perhaps, an old crater: and indeed there is a tradition amongst the natives, that a large village with its inhabitants was suddenly engulphed during an earthquake.* 1841.

The net was prepared and laid out by the assistance of a native canoe, which fortunately happened to be near the spot to which our guide had taken us. The first haul, in which we were assisted by the natives, gave us nothing but roots and limbs of trees, to their great amusement, and our net was very much torn: this occupied us some time to repair, when we moved to a more clear-looking space; but here we were almost equally unsuccessful, a few mussels and some very small fish, (valuable additions, however, to our collection of natural history,) were all we procured. The natives of the neighbourhood, who had collected in consi-

* Vol. i. p. 244.

1841. derable numbers, seemed greatly to enjoy our disappointment, and but for the presence of Mr. Taylor would doubtless have proved troublesome. They were very jealous of our going there to fish, and, probably alluding to the large supplies we had obtained for our crews in the various coves of the bay, sneeringly asked us, "If we were not satisfied with the fish of the sea?"

They had, no doubt, purposely taken us to those parts of the lake most difficult to fish with a seine, and at first laughed heartily, and, as we thought, goodnaturedly, at our ill-success; but when they saw we were not at all disconcerted at their merriment, but replied to their jokes, they began to manifest some degree of ill-humour, for they could perceive that we in our fun had turned them rather into ridicule, which of all things, I afterwards learned, they are least able to bear. Eels are said to be large and numerous in the lake, but are only taken at night, by means of ingeniously contrived baskets, something like those employed on our own and the Norwegian coasts for catching lobsters: not having caught any, we bought a few from the natives, which answered their purpose and ours equally well.

We were prevented crossing the lake to the cleft mountain by a strong breeze arising, and rendering the passage in our little punt too dangerous and tedious, as it could only carry two, and it would have occupied the whole of the remainder of the day to get our party across. At the sug-

gestion, therefore, of Mr. Taylor, we abandoned this object, which we could not have satisfactorily accomplished, and made up our minds to ascend the Puki Nui mountain, which was well within our reach. Our barometrical observations gave the elevation of Lake Mapere above the level of the sea seven hundred and eight feet, whilst that of Waimati was only six hundred and twenty-three feet. 1841.

We reached the summit of Puki Nui at a quarter past three in the afternoon, and were richly rewarded for our labour, as it afforded us a complete view of the whole of the surrounding country. The mountain itself is a volcanic vent towering high above all the others, and commanding from its top a view of the sea on each side of the island. The weather was beautifully clear, and the heads or entrance of the harbour of Hokianga were clearly visible. Mr. Taylor informed me that the chief establishment of the Wesleyan missionaries is at this place: these pious men followed soon after the Church of England missionaries had established themselves amongst the natives, and like them their beneficent labours have been abundantly blessed.

From this point also we could much better perceive and understand the great improvement in cultivation of the soil by the Christian natives than any description could have afforded us: before the introduction of the gospel of peace, they were compelled by the hostility or ambitious avarice of neighbouring tribes to live congregated together

1841. in fortified places, or pahs, as they are called, and of which vestiges were still to be seen on the top of almost every hill in the country; the cultivation of the Kumara, or sweet potato, upon which they principally lived, being confined to the sides of the hill, or seldom extending beyond the valley. Since, however, peace has been preached and war has ceased to be their chief occupation, we find them dispersing in small groups over the more fertile parts of the land, building detached cottages or small villages, and living in a degree of comfort and security to which they were formerly strangers, and of which they seem fully to appreciate the advantage. Nearly the whole of the extensive valley which we now saw under cultivation, and which so greatly excited our interest, was once the scene of some of the horrible and barbarous deeds, and at a later date the refuge, of the detestable Shoongi. The atrocities of this savage chief have rendered his name execrable amongst his countrymen, and serve to show in a striking manner how impolitic and improper it was to place so superior a power in the hands of a wretch who seems to have possessed no other feeling than that of vengeance and thirst for the blood of his former conquerors, and of which he let no opportunity pass of gratifying.

Our observations gave the height of Puki Nui one thousand two hundred and forty feet above the level of the sea. The highest range of mountains in sight to the southward is called by the natives

Ikorangi, or "Fish of Heaven," but we had no 1841. means of measuring their elevation. The highest land to the north is called by them Maunga Taniwa, of which I did not learn the meaning. We descended the hill, and arrived in the evening at Waimati, after a fatiguing day's work.

We again set out at an early hour the next morning for the hot springs, at Taiami, called Tuakino: our road lay over a hilly and barren country, of which the most remarkable feature is the three volcanic conical hills which stand in the middle of an extensive depression of the table land, and of which Dr. Dieffenbach has given an account in his travels in New Zealand.* After three hours' laborious walking we reached the first lake, shortly before noon, and halted to obtain observations for latitude. The temperature of the lake was 62°, that of the air being at the time 60°. It is about half a mile in diameter; on its shores we observed numerous charred stems of trees, and near its centre a large flock of ducks, probably feeding on a small kind of fish, of which we saw a great many. Some pieces of pure sulphur were picked up along the margin of the lake.

The temperature of the smaller lake, near which are the hot springs, at only a short distance from the former, was found to be 65°·7, and that of the gaseous jets or bubbles that are continually rising in it 66°. Numerous holes had been dug, in

* Vol. i. p. 245.

1841. the clay soil through which the hot sulphureous water issues, by the natives who had visited this spot for the benefit of the waters, which are considered an efficacious remedy for all cutaneous and scrofulous diseases, with which the New Zealanders are so much afflicted, that few of them are without strong marks of the latter on the glands of the throat.

The temperature of these holes varied from 150° to 80°, in proportion to the length of time they had been dug, the heat passing away gradually after exposure to the atmosphere. We had provided ourselves with the means of digging fresh holes, and these we found also to vary considerably in temperature, although quite close to each other. The hottest, of eight or ten that we dug, was 179°, and in this we cooked some eggs which we had brought with us for the purpose, and served to form part of our luncheon, although their shells were deeply stained with the sulphur. As Dr. Dieffenbach truly remarks, the surrounding country, especially to the southward, has to a singular degree the barren and desolate aspect so often observed in places celebrated for their salubrious mineral waters. Scarcely any verdure is to be seen on the hills of the neighbourhood: it is only in the ravines that the uniform brown tint of stunted fern is interrupted by the green of some sheltered groves.

Whenever this country shall have become thickly populated with Europeans, these springs will become of equal importance to the colonists with the most

celebrated baths of our own country or the spas of Germany. 1841.

Their elevation above the level of the sea is six hundred and forty-eight feet by barometrical measurement. We remained so long at this place, that we had hardly time to get back to Waimati before dark.

As the weather was very unfavourable the next day for making further excursions in the neighbourhood, we prepared to return to the ship, being unwilling to prolong our absence beyond the time I had at first proposed, upon the uncertainty of fine weather succeeding; and we had yet some important objects to accomplish before leaving New Zealand. We therefore took leave of the kind friends whose hospitality and attentions had afforded us three days of most agreeable relaxation from our severe duties, and returning to the Keri Keri by the road we came, we embarked in our boat, and arrived on board the Erebus early in the afternoon.

On the 20th of October the French corvette Héroine anchored off Kororarika, and I had the pleasure of receiving a visit from her commander, Captain L'Evêque. He informed me that they had experienced some very severe weather off the south coast of New Holland, and that his crew was in a sickly state. He had touched here for fresh provisions, and was on his way to Port Akaroa, in Banks' Peninsula, where a number of settlers from France had gone last year to form a colony, but found on

1841. their arrival there that it had been taken possession of a few days previously by the English. They were not allowed by the English authorities to build any fortifications, or land their guns or munitions of war, beyond what were absolutely necessary for personal protection; and were at this time getting on prosperously under the protection of the British flag. The next day Commander Crozier and I returned Captain L'Evêque's visit; and on acquainting him with my intention to visit the Chatham Islands, he very kindly furnished me with a more accurate plan of them than any with which we had been supplied.

We owe this valuable survey to the diligence and research of his predecessor in command of the Héroine, Captain Cécille, whilst employed in the protection of the French ships engaged in the whale fishery. The islands were almost entirely unknown to us, no British man-of-war having been there since their discovery by Lieutenant Broughton, in the Chatham, tender to the Investigator, in November, 1791, after his separation from his commodore, the justly celebrated navigator Vancouver.*

Captain Cécille had been induced to visit the islands by hearing from the master of an American whaler, who had recently been there, that a French vessel, the Jean Bart, had been captured and de-

* For an interesting account of his discovery of the islands and unfortunate affray with the natives at Skirmish Bay, see Vancouver's Voyage, vol. i. p. 84.

stroyed by the natives, and the crew inhumanly murdered. 1841.

His chief object, therefore, in going there was, in his own words, "*pour venger sur les insulaires le massacre de nos compatriots;*" and also to afford relief to any of the crew that might by possibility have escaped to some of the contiguous islets. On his arrival at the great western bay of the island, he found the accounts he had received were but too true; the remains of the burnt ship were still to be seen, and one of her boats was recovered, but he could not hear anything of the crew, nor whether any of them had escaped in the boats of the ship. Although his arrangements appear to have been made with the greatest judgment, yet he did not succeed in securing the principal actors in this dreadful tragedy. He, however, landed a large force, and totally destroyed their pahs or strongholds, and burnt as many of their boats as he could find, thus depriving them of the power of attacking any other vessel. He succeeded also in decoying one of their principal chiefs, named Eitouna, and two of his people on board, whom he kept as prisoners, and from whom he derived the following information respecting the circumstances which led to the unfortunate collision with the New Zealanders.

The Jean Bart arrived at Chatham Island early in May, and before she gained the anchorage several canoes belonging to the two tribes of New Zealanders who had possessed themselves of the island went alongside. It was about 2 P.M. when

1841. the ship anchored in the small bay of Wai-Tangui, upon the shores of which the tribe of Eitouna were established. The captain, frightened at seeing so many savages on board, desired the chiefs to send them on shore. Eitouna gave orders to his people to leave: many obeyed, others remained to make some exchanges with the sailors: all the people of Eimaré, the chief of the other tribe, also remained on board, so that there were still seventy to seventy-five of them left in the ship. The captain, not thinking himself safe, prepared immediately to quit the bay, and refused to read some certificates that Eitouna presented to him to inspire him with confidence.

Eitouna and many others were in the cabin of the Jean Bart, when suddenly they heard a great tumult on deck: they immediately endeavoured to make their way up the ladder, when a wounded New Zealander fell from the deck amongst them; they then returned into the cabin to conceal themselves when the skylight was immediately removed; and Eitouna said they tried to kill them with lances and spades, which they thrust into all parts of the cabin; many of those in the cabin were wounded, some were killed: they looked about for some arms to defend themselves, and found a double-barrelled gun and some pistols in the captain's cabin, but these being percussion, and having no caps, they were useless to them. At length they found some muskets and cartridges, with which they killed two of the seamen. The sky-

light was instantly put on again, and fastened 1841.
down by the people on deck, and soon afterwards all was silent. Eitouna supposes that the captain and crew became alarmed when they found the New Zealanders in possession of fire-arms, and had barricaded all the hatchways, to gain time to get out their boats and make their escape; for when he and his party eventually got upon deck, there was no one to be seen. He stated that twenty-eight of their men and one woman were killed, and twenty others wounded. He believes that the attack was provoked by the people of Eimaré's pah, who wished to get possession of some articles which the seamen endeavoured to prevent; he said, also, that had it not been for the fire-arms they found, the French would have put them all to death. The fight lasted from two hours after sunset until two o'clock in the morning.

Captain Cécille had learned at the Bay of Islands that the pahs of Chatham Island were placed beyond the reach of the guns of a vessel at the anchorage; he made his dispositions accordingly, and landed a large force the day after his arrival. The party met with no resistance: all the pahs were abandoned; they saw a few of the New Zealanders, who fled into the woods, where it was neither prudent nor possible to follow them. The fortifications were entirely destroyed by fire, as well as some large canoes: they also found several articles that had belonged to the French whaler, and one of her boats, which was launched and taken on

1841. board the Héroine. By four o'clock in the afternoon there remained of all their extensive establishment, of a quarter of a league in length, and which was pallisaded throughout, nothing but a heap of ashes.

In the mean time Eitouna had been a prisoner on board two days in the greatest uneasiness: he inquired frequently when they would put him to death. Not willing to prolong this mental torture, Captain Cécille acquainted him that he and his two companions should remain prisoners in the vessel, and be taken to France, when the King would decide their fate.

They soon became reconciled to their situation; and Captain Cécille having satisfied himself that Eimaré and his people were the aggressors, he contrived to open a communication with the people of Eitouna's tribe, and succeeded so far in assuring them of their safety from any further punishment, that several of them came on board to take leave of their chief.

After having landed on another part of the island, and destroyed some more pahs and canoes belonging to Eimaré's tribe, he visited Pitt Island, under the impression that as only one of the boats of the Jean Bart was to be found, it was very probable that those which were missing had been taken by the survivors of the crew, in which they might have sought a place of safety upon this contiguous islet. Eitouna appeared also to have been of the same opinion. But as all their searches

after them proved fruitless, it is most likely that those who escaped the assault of the New Zealanders perished in their attempt to reach New South Wales, or were murdered by the savages that inhabit Pitt Island. 1841.

As Captain Cécille's observations and description of Chatham Island and its anchorages may prove useful to our whalers or other vessels that may have occasion to touch there, I have given them in the Appendix to this volume, being the best information we at present possess.

The people with whom the French had been engaged, were not the aborigines of the island, but part of a large number of New Zealanders who had been taken to the island in an English vessel, the Lord Rodney, amounting to between four and five hundred, whom the inhabitants of the island, of about an equal number, allowed quietly to settle there. A scarcity of provisions soon followed their arrival, when the New Zealanders fell upon the aborigines, and killed above two hundred for food: the rest they reduced to slavery.

The present population consists chiefly of inhabitants of East Cape and Port Nicholson, and a few turbulent natives of Teranaki. They arrived at Chatham Island, under the command of Hépatou. Since his death, in 1836, they divided into two tribes: the one staid at Wangaroa, under Eimaré, the other established itself at Wai Tangui, with Eitouna, as its chief. Chatham Island is called

1841. Wairi Kaori (large mountain) by its New Zealand inhabitants. It is very fertile, and the potatoes grown there are of a very superior quality. Corn has not succeeded, in consequence of the great number of parroquets which destroy it before it is ripe. An Englishman of the name of Coffee, who had lived five years on the island, had never seen any ice there, but remembers the occurrence of a single fall of snow.

The Héroine had been again sent to these seas for the protection of French whaling vessels, and to prevent a fraud which they had extensively practised. The French government had lately offered a bounty for the encouragement of the whale fishery, and the reward was granted in proportion to the success of the vessel. But the object for which it was intended was entirely defeated, for instead of capturing the whales themselves, they purchased oil from the American and English whalers, and, carrying it home, received the bounty, as if it had been the produce of their own skill and enterprize. From Captain L'Evêque I also received a chart of the discoveries of Admiral d'Urville in the southern seas, which I had not before seen. On quitting the Héroine, we were honoured by a salute of eleven guns, which was returned with an equal number by the Erebus. After remaining two or three days at anchor off Kororarika, the Héroine sailed, on a favourable breeze arising, for Akaroa.

During the whole period of our stay in the river

Kawa Kawa, our crews were abundantly supplied with excellent fish, which the numerous creeks and small beaches around the shores of the bay and river afforded. The more delicious of these were the John Doree (Zeus Australis) and the red mullet; the largest, a kind of mackarel, called yellow tail, and sometimes cavallo, though coarse, was found to be very good eating. Of the last we caught several in the seine, three feet nine inches in length, and weighing nearly fifty pounds: the soles, though small, are very good, and the plaice of large size are equal in flavour to the Dutch fish: the Barracouta is caught in the proper season, which had not arrived before we quitted the place. Sharks of a formidable size are numerous, and of these several new species were captured by us: they are described, together with the rest of our extensive collection of other kinds of fish, by Dr. Richardson, in the zoology of the voyage, amongst which are many genera and species hitherto wholly unknown: his account of them will, I have no doubt, prove a valuable addition to our knowledge of the finny tribes of the southern seas. A description of the birds we collected at New Zealand, will be published in the same work, by Mr. George Robert Gray, of the British Museum. 1841.

Our crews maintained very good health, so that it was seldom we had any one of them in the sick report, and then, generally, only for some trifling accidental hurt: but we had the misfortune to lose one of our shipmates, and in him one of

1841. our best men, George Barker, marine, who was drowned by the upsetting of a boat.

The proper season for renewing the exploration of the Antarctic Regions being now near at hand, we concluded the hourly magnetometrical observations at the end of the month of October; and the absolute determination of the three magnetic elements was obtained in the course of three or four following days. The observatories and instruments were re-embarked, and our ships prepared for sea by the middle of November.

The Favourite had been despatched to Sydney at the request of Sir George Gipps, who was desirous of visiting Norfolk Island, to inquire into the cause of the insubordination reported to prevail there; but events having since occurred which rendered his visit unnecessary, and therefore not requiring her services, she returned to New Zealand, where her presence was more likely to be useful, bringing us letters from England, and some stores which we had omitted to get before our departure from Sydney. During this short cruize she was found to be so leaky that it became necessary to make a thorough survey of her condition: Commander Crozier, and the other officers who had been appointed to assist him in this duty, reported that the leak was occasioned by the copper being very much worn away, and by the oakum having worked out of the seams in several places. As it was not possible to get at the leaks without heaving the ship down, I directed Commander

Sulivan to proceed to Auckland; and if Governor Hobson, who had by this time returned from the southern settlements, did not require her for any urgent or immediate service, I recommended him to go direct to Port Arthur in Van Diemen's Land, and there make all necessary repairs, and thoroughly refit her in readiness for any service that might be required, as, from her being the only man-of-war on the station, it was the more necessary that she should be immediately brought into an efficient state. 1841.

The want of a sufficient naval force for the protection of the numerous colonies that Great Britain has recently established in this quarter of the world, has been a just cause of complaint, and has occasioned pressing representations on the subject to the home government by the successive governors, but without any effect. Indeed, it is difficult, almost impossible, to keep the colonies regularly visited by ships from the East India station, to which they at present belong, and which is too remote to admit of provision being made for the many contingencies that arise. It is therefore desirable that a distinct naval command should be formed, and consist of several ships. Sydney should be the head-quarters of the commodore of the squadron, and the vessels belonging to it might be sent to each of the other colonies in turn, and by maintaining a zealous and cordial co-operation between the naval force and the respective governments, inspire a feeling of security and confidence amongst the

1841. settlers, and prevent hostile attacks from the natives. One of the vessels should occasionally visit the Friendly, Society, and Feejee Islands, for the encouragement and protection of British subjects engaged in commercial pursuits, and for the purpose of strengthening the now existing friendly disposition of their inhabitants towards Great Britain. Frequent disputes occur between the masters and crews of whaling and other merchant ships in those remote regions, where an appeal to the captain of a man-of-war would be generally more effectual, and more satisfactory to both parties, than the interference of the civil authority, for which seamen, in general, have very little respect or fear, especially in the newly-established colonies, where there is seldom sufficient power to enforce the laws, and where there is usually a great dislike to meddle in nautical matters, which are generally but little understood.

In the various groups of islands of the Pacific, mutinies, piracies, and other disgraceful proceedings are but of too frequent occurrence, to the degradation of our national character, which even the expected arrival of a man-of-war would sometimes prevent, and her presence would always check or rectify such reprehensible irregularities. In the course of our voyage, I had several times occasion to put matters to rights between the master and the crew of merchant vessels, and restore harmony and good feeling, which could not have been accomplished by any other means, al-

though, be it remembered, I had no legal authority to interfere beyond giving my advice to the parties concerned, except only in extreme cases; but by pointing out the consequences that would result to them, and the penalties to which they were rendering themselves liable by their improper proceedings, I always accomplished my object. 1841.

The result of our observations gave the latitude of the place of the observatories 35° 17′ 46″·6 S., longitude 174° 8′ 22″·7 E.; the mean magnetic dip between the 23rd of August and 25th October, 59° 33′ S., the

Variation between	26th and 31st of August,	13° 33′ 52″·5 E.
	1st and 30th of Sept.	13° 34′ 54″·6
	1st and 23rd of Oct.	13° 38′ 45″·9
	and first week of Nov.	13° 40′ 50″

showing a gradually increasing easterly variation.

The following are the results of our tidal observations:—a tide gauge was fixed at a convenient distance from the astronomical observatory, and the height of the tide was recorded every quarter of an hour, when near the time of high and low water, or every hour, at other times, day and night between the 14th of September and 19th of November, through a space therefore of two complete lunations, or five periods of full or change of the moon, viz.:—

It was full moon on the 15th September, at $5^h 38^m$ A.M.; the following high water occurred at $7^h 30^m$, the amount of rise being then five feet nine inches; the highest and largest tide was the third

1841. high water after new moon, and the amount of tide six feet ten inches.

October 1st.—Full moon at $3^h 55^m$ A.M., high water at $7^h 22^m$ A.M., amount of tide five feet two inches; the highest and largest tide being the seventh high water after full moon, and amounted to six feet one inch; the strength of the stream of the flood at the anchorage 0·6 mile per hour, and of the ebb 1·2 mile per hour.

October 15th.—New moon $4^h 2^m$ A.M., high water $7^h 15^m$ A.M., amount of tide five feet seven and a half inches; largest tide the seventh high water after new moon, being six feet one inch; strength of the flood 1·0, and of the ebb 1·4 mile per hour.

October 30th.—Full moon $5^h 33^m$ P.M., high water at $7^h 30^m$, rise of tide five feet six inches, largest tide the sixth after the change of moon, amounted to six feet two inches, stream of flood 1·0 and of the ebb 1·2 mile per hour.

For practical purposes we may therefore assume that the time of high water next after the full and change of the moon takes place at about $7^h 22^m$; that the amount of tide on that day is about five feet six inches; and that the highest tide occurs very irregularly, but may be looked for generally about the fifth or sixth high water after the full or change of the moon, at which time it varies in amount from five feet ten inches to six feet ten inches; and that at the strength of the flood-tide in the middle of the stream, its rate is rather less than one mile, and

that of the ebb nearly one mile and a quarter per hour; but both are considerably modified by the very heavy rains which occur at this period of the year, and by which the velocity of the ebb tide is much increased, whilst that of the flood proportionally retarded. 1841.

On any other day than that of full and change of the moon, the time of high water occurs, on an average, at $7^h\ 22^m$ after the moon passes the meridian.

The state of the tide was registered by the petty officers on duty at the observatory, and the velocity of the stream measured every half hour by one of the quarter-masters of the Erebus, under the direction of the officer of the watch.

I have been the more particular in stating these phenomena of the tides, in consequence of our observations differing widely from those of others who have visited this place. Captain Fitzroy states the time of high water, at full and change, to be $9^h\ 16^m$, and the amount of tide six feet; and Captain Cécille, who made his observations at Kororarika, states that the establishment of the Port is $5^h\ 40^m$, and the amount of tide six feet six inches.

CHAPTER V.

Outrage at the Bay of Islands. — Sail from New Zealand. — Proposed Whaling Station at Auckland Islands. — Dangerous Reefs. — North-west Reef and Dangers off Chatham Island. — Nimrod Islands. — Penguins. — Appearance of Land. — Circle of Mean Temperature of the Southern Ocean. — First Iceberg seen. — Focus of Greater Intensity. — Enter the Pack. — Animalculæ. — Magnetic Observations on the Ice. — Beset in the Pack. — Meteorological Abstract for December.

CHAPTER V.

ALL our arrangements being completed, the ships were unmoored on the evening of the 22nd of November, in readiness to sail at an early hour the next morning. Late at night Commander Sulivan brought on board a letter he had just received from a surgeon at Kororarika, who held also the office of coroner, stating he had received information that a most atrocious murder had been committed by a party of "Maoris," who, after killing Mrs. Robertson, an European woman, three children, and her man-servant, had set fire to the house; and the inhabitants of the town, being in dread of an immediate attack, requested that an armed force might be landed for their protection. As this application was not backed by the magistrate, although he had been solicited to do so by the constable whom the coroner had charged with the delivery of it, I suspected that he considered their fears groundless. I, however, directed Commander Sulivan to send a strong party immediately to the village to make more particular inquiries into the circumstances, and report to me, without loss of time. Lieutenant Ellerman, to whom this duty was intrusted, returned soon after midnight, and acquainted me that he had found the inhabitants in a state of

1841.
Nov. 22.

1841. great excitement and alarm, but that he could not hear that any number of natives had assembled in the neighbourhood, and that many circumstances concurred to show that the murder had been an act of individual vengeance. It did not appear to me necessary to interfere any further; I therefore directed the force to be withdrawn as soon as their fear of an attack had subsided, as the civil authority was sufficiently powerful to arrest the murderer, who, of course, had fled into the bush. The natives had long threatened to repossess themselves of the island which Mrs. Robertson's husband had purchased several years before; for they thought when they sold their land it would again revert to the tribe on the decease of the purchaser. Mr. Robertson was drowned in sight of his own house shortly before this melancholy event, and Mrs. Robertson had the day previous to it attended the Court of the Commissioner for settling the claims to land, and had substantiated her right to the island in question: the murder following so immediately, led to the supposition that the deed had been done by the tribe who claimed the island, and that they intended to establish their claim by force. But the following account of the horrid tragedy which is given by Mr. Marjoribanks in his recent account of New Zealand, places the event in its true light. He says that Mrs. Robertson, the widow of a Captain Robertson, was a Sydney lady, and resided on one of the numerous islands from which the Bay of Islands derives its name. It had belonged to

her husband, and at this time she and her family were the only occupants. She had employed this young chief, who was a remarkably powerful lad, though only sixteen years of age, to assist her white man servant, Thomas Bull, in some of her farming operations; and Thomas having told Mrs. Robertson that the Maori was a lazy fellow, he watched the opportunity, when Thomas was asleep, to split his skull open with an axe. Mrs. Robertson having accidentally happened to come upon him, when in the act of doing so, he judged it advisable to despatch her also with the same instrument, and then the two female children. Mrs. Robertson's son, seeing what was going on, fled to a mountain close by, but the monster overtook him, and threw him headlong over the rock, two hundred feet high, so that he was literally dashed to pieces. One of the children was the grand-daughter of Nene, the great chief of the Ngaphui tribe, which principally inhabits Kororarika; and her murder, which led to hostilities between Nene and the notorious Heki, was the means of preventing the destruction of the town of Auckland and its inhabitants, which the latter had declared his intention to accomplish, and which even the humane and wise policy of Governor Fitzroy could not have averted. 1841.

The murderer, having effected his purpose, set fire to the house in order to conceal the foul deed; and it was seeing it in flames that excited the fears of the inhabitants of Kororarika, and led them to

1841. believe the whole tribe of "Maoris" was upon them. He was afterwards given up by his father, who dreaded the vengeance of Nene. He was taken to Auckland, tried, condemned, and executed on the 7th of March following, with great formality, being the first execution that had taken place in the colony since the establishment of the British government.

Nov. 23. At 5 A.M. the following morning, we weighed and made sail out of the harbour, accompanied by the Favourite, until 10 A. M., when she parted company, giving us three cheers. Commander Sulivan proceeded to Auckland, to acquaint Governor Hobson with the murder which had been perpetrated at the Bay of Islands, and to act according to his wishes; for if he should have thought it proper to have taken any measures for the defence of Kororarika, the Favourite could have returned to that place the next day.

As soon as we got clear of the land we shaped our course for Chatham Island, which I was very desirous of visiting, not only for magnetic purposes, but because very little was known of its capabilities for colonisation, or as a whaling station, although for this latter purpose I had no doubt the Auckland Islands would be found far more suitable. I have much pleasure in stating that since the first volume of this narrative was printed, I have learned from good authority that Her Majesty's Government has granted, or engaged to grant, to those truly enterprising

merchants, the Messrs. Enderby, by whose vessels they were discovered, the exclusive possession of the Auckland Islands; and that it is the intention of those gentlemen to form a company, for the purpose of carrying on from thence the southern whale-fishery. In a national point of view, whether as regards our maritime or commercial ascendency, an undertaking of this nature cannot fail to be of very great importance. Its successful accomplishment would prove the means of effectually restoring a profitable but decayed branch of our maritime trade, and of diverting a large number of our most efficient seamen from the vessels of the United States of America, in which they are now employed. In the whole range of the vast Southern Ocean, no spot could be found combining so completely the essential requisites for a fixed whaling station. 1841.

Possessing in themselves the great natural advantages of commodious harbours, a plentiful supply of good water and wood, with a superficies of about one hundred thousand acres,- and lying in the vicinity of the Australian and New Zealand colonies, these islands present the greatest facilities for carrying on the southern fishery on the extensive scale, which the Messrs. Enderby contemplate. They are, moreover, situate, as it were, in the heart of the fishery, and in the track of ships returning to England from the Australian and Van Diemen's Land settlements. They are also conveniently placed, in a more

1841 general point of view, since every vessel in the Pacific must proceed to the southward beyond their latitude, before doubling Cape Horn, on their passage to England or America.

The Americans are fully sensible of the advantageous position of the islands, and frequently visit them for the purposes of refitting or refreshment; they are also resorted to for similar purposes by the whaling ships of France and other nations, whilst they have been hitherto only too much neglected by those of the nation to which they belong.

There is, besides, a further benefit to be anticipated from the islands becoming, as proposed, the future seat of a whaling station, on a systematic plan, which is, that their colonization will grow out of their being so appropriated; and what population could be more fitted to inhabit them than a race of hardy, enterprising British seamen?

This project is not a recent one on the part of the Messrs. Enderby, but was formed by them nearly three years ago, immediately upon the return of our expedition, contingently upon the islands being granted to them by the government; and I most cordially wish them the success their spirited conduct so well deserves.

We had a fine run during the night, and at
Nov. 24. noon the following day we were in latitude 36° 27′ S. and longitude 177° 34′ E. In the evening the land of the East Cape was distinguishable, bearing S. 15° W. (true). I was informed by the master of a schooner belonging to the Church of England

Missionaries, who had made frequent visits to 1841.
Poverty Bay, that there is a dangerous reef eighteen miles off shore, bearing due east by compass from the north head of the bay; it lies in a N.W. and S.E. direction, is three quarters of a mile long, and over it there is only five feet water; the breakers on it may be seen distinctly from the shore. It is a danger not generally known, and, therefore, it is the more necessary to call the attention of seamen to it: when the island is open with the point you are just abreast of the reef, but if shut in on either side, you are clear of it. He also mentioned to me that he had seen another reef due north from the north end of Flat Island, half a mile long, four inches above water at low water spring tides, and distant about eight miles from the land. Neither of these dangers was seen by us, and it is probable that their position is not very accurately determined.

During the day we observed many sooty albatross, Nov. 25.
the dark-coloured and elegant blue petrel, as also the Cape pigeon. At noon we were in lat. 38° 17′ S. and long. 179° 51′ E., and crossed the meridian of 180° at 2 P.M. Soon after noon the wind veered to the southward, with considerable swell, so that the ship could not lie her course, and made much leeway; the breeze freshening as the evening advanced, and blowing a gale by midnight.

Having, by sailing to the eastward, gained Nov. 25.
twelve hours, it became necessary, on crossing the 180th degree, and entering upon west longitude,

1841. Nov. 25. in order that our time might correspond with that of England, to have two days following of the same date, and by this means lose the time we had gained and still were gaining, as we sailed to the eastward.

We had, therefore, two Thursdays and two twenty-fifth days of November in succession; so that, after crossing the meridian, and having made the alteration of a day, instead of being twelve hours in advance, we became so much in arrear of the time in England, which would gradually diminish as we pursued our easterly course, until on our return we should find them in exact accordance. Had we not made this alteration, our Christmas-day and New Year's-day would have been one day earlier than in England. It is fortunate we did not cross into west longitude on either of those days, for two such holidays in succession would have been a still more novel circumstance.

The sea exhibited many large luminous patches during last night, and to-day many stormy petrel, and immature birds of the large albatross kind and small dark petrel were numerous.

In the evening the gale abated, but the wind continuing fresh from the southward, we made but small progress; and as the adverse breeze prevailed the whole of the two following days, we

Nov. 27. found ourselves at noon still a hundred and eighty miles from Chatham Island, being in latitude 39° 16′ S., longitude 177° 2′ W. At 1 P.M. we tried for soundings, with six hundred fathoms, without striking ground. It was quite calm at the time, so we tried the temperature of the sea, as follows: at

600 fathoms it was 44°·9; at 450 fathoms, 46°·8; at 300 fathoms, 49°·2: at 150 fathoms, 53°·5; and at the surface, 58°; the specific gravity of the surface water, 1·0274; at 150 fathoms, 1·0272, and at 450 fathoms, 1·0268; all tried at the temperature of 60°, and showing that the water beneath was specifically lighter than that of the surface, when brought to the same temperature; our almost daily experiments confirmed these results. 1841.

Soon afterwards a breeze sprang up from the northward; heavy showers of rain, and a falling barometer, as usual accompanied the northerly wind; but what surprised us was, that the temperature of the air *fell* in the course of two hours from 63° to 54°; that of the surface of the sea not being altered by the change of wind. It is probable that this effect was produced by the rain having fallen from a great elevation, and therefore of a very low temperature; but it was unfortunately omitted to be noted.

At eight in the evening of the 29th, we were Nov. 29.
only fifty miles distant from the Sister Islets, and a reef of rocks which lies about six leagues to the northward of Chatham Island; but as the night was fine and the wind favourable, we continued our course for its N.W. point, named Point Allison, heaving to occasionally to try for soundings, as we approached these dangerous and almost unknown shores.

Thick weather came on during the night, which rendered these precautions the more necessary.

1841. We saw large patches of sea-weed; and the number and variety of sea-birds greatly increased. The minute petrel (the equivalent of the little auk of the northern regions, and very like it), as well as the black-backed gull, neither of which are met with far from land, and the long-snouted porpoise, were particularly numerous; one of these creatures was struck with a harpoon, and in its formidable jaws we found the teeth, which the New Zealanders value highly as ornaments, and which had puzzled us greatly to ascertain to what animal they belonged.

Nov. 30. Shortly before eight in the morning breakers were seen directly ahead of us, and about one mile distant, which obliged us to alter our course slightly to avoid them. These rocks are called the North-west Reef, and lie about five miles in that direction from the Sister Islets; they cover a space not exceeding fifty yards in diameter, and no part of the rocks could be seen above water. The fog at this time became so thick that we could not see any object at more than half a mile distance; and although we must have passed quite close to the Sister Islets, which are about one hundred feet high, we did not see them. Steering direct for Point Allison, with hopes of the fog clearing away about noon, we found ourselves at that time above three miles to the northward of it, and in half an hour afterwards passed within a mile of it, without being able to distinguish it through the dense fog that prevailed. We had some difficulty in keeping the

Terror in company, by constantly firing guns; and finding it impossible to make the land, I was unwilling to lose time by waiting for more favourable weather; so, after heaving to for a short time in the afternoon, and sounding in one hundred fathoms, on a bank of greenish sand, we bore away to the south-westward, to get clear of the west reef before dark. 1841.

The temperature of the sea at one hundred fathoms on this bank was 50°·2, being as low as that at two hundred fathoms in the deep sea of yesterday.

We passed the west reef so near as to hear the roar of the sea breaking over it, but the thick fog prevented our seeing it; and as soon as we got well clear of all the known dangers that surround the Chatham Islands, we steered to the south-eastward, for the purpose of ascertaining a magnetic desideratum of great interest. It was supposed that a second point of greater magnetic intensity would be found in about the lat. 60° S. and long. 125° W., but as our time did not admit of our going to the spot, our course was so directed as to enable us to cross the lines of the Isodynamic oval in such places as should be best calculated to secure its accurate determination.

The wind prevailed from the N. E., but the foggy weather continued the greater part of the next day. Our observations at noon placed us in lat. 45° 40′ S., long. 176° 41′ W., by which also we found that we had been carried S. 8° W. twenty- Dec. 1.

1841. eight miles by a current, the greater part of which I have no doubt occurred as we passed along the west side of the Chatham Islands, where we observed, in many places, strong ripples and whirls of tide.

Many patches of seaweed were passed during the day, and the albatross and several small kinds of petrel played about us in great numbers.

Dec. 2. It was a beautiful day, the wind fresh from the N.E.; and again we found the current had carried us twenty miles in a S. 4° W. direction. In the afternoon we passed a wicker basket and several small pieces of wood, from which we concluded that we were crossing the track of some vessel homeward bound from Tasmania.

Diverted from our proper course by the N.E. wind, we gradually approached the supposed locality of a small group of islands called the Nimrods, but as they have been searched for so often without success, I should have looked for them rather to the east or west of their presumed position, had the wind suited, and far from the tracks of other navigators; but my purpose was defeated by adverse circumstances of wind and weather, so that we could not get within two hundred miles of their assigned place.

Dec. 3. Several sperm whales were seen this morning, and during the night we had observed a great number of luminous patches, and some very large *pyrosoma* were taken in the towing net: a boat was lowered in the afternoon to try the current,

whilst making the usual experiments on the temperature of the sea; it was found to be setting to the southward (true), nine miles in the twenty-four hours. Some pieces of seaweed, with barnacles attached to them, were brought on board. The barometer attained the unusual height of 30·45 inches, with a moderate N.E. wind and overcast sky. At night the cry of penguins was heard, and again the luminous patches in the sea were numerous and brilliant. 1841.

This morning we had a very light breeze from the N.E., and towards noon it fell perfectly calm, with the surface of the ocean beautifully smooth; thus affording a most favourable opportunity of trying its temperature at a great depth. A new line had been prepared for the purpose, and thermometers were attached to it at intervals of one hundred and fifty fathoms: we had no soundings with eleven hundred fathoms, and beyond this I did not venture to send the thermometers. In hauling the line in it broke, and two of the new thermometers which had been sent out to me for the purpose of deep sounding, were lost; we had still three others left, and the opportunity was too good to be lost, notwithstanding this accident. Another line was immediately prepared, and the thermometers which were sent down to a thousand and fifty fathoms came up again quite safe, after sustaining such enormous pressure, and recording the temperature at that deep region of the ocean to be exactly 40°, or thirteen degrees below that of the surface. The tem- Dec. 4.

1841. perature at the intermediate depths was as follows: at 900 fathoms, 40°·2; at 750 fathoms, 41°; at 600 fathoms, 42°·2; at 450 fathoms, 44°·5; and at 150 fathoms, 48°·7: so that the mean temperature of the ocean is at least nine hundred fathoms below the surface in latitude, 49° 17′ S., and longitude, 172° 28′ W.

These experiments, which had occupied us about five hours, were hardly completed, when a breeze sprang up from the northward, before which we made all sail. Sperm whales, patches of sea-weed, and flocks of penguins, were seen in such abundance, that I was in great hopes of meeting with land. Although we did not see any, I think it not improbable that some small islands may be eventually found in this neighbourhood, however much the great depth of the sea may seem to militate against the supposition. The penguins were all going to the eastward, and I have no doubt proceeding to their breeding quarters, perhaps to the Nimrod Islands. It is a wonderful instinct, far beyond the powers of untutored reason, that enables these creatures to find their way, chiefly under water, several hundred miles, to their place of usual resort, as each succeeding spring season of the year arrives.

Dec. 5. Another most beautiful day. A large shoal of the bottle-nose whales played about the ship, and kept company for several hours. A piece of drift timber and many patches of sea-weed were seen; great numbers of penguins of a large species were observed making their way to the eastward; and,

probably from our expectation of seeing land, many false reports of it were made from the mast-head: dense clouds arose in the evening to the eastward, whose strongly marked outline assumed the appearance of land, and were the cause of these frequent mistakes. 1841.

Favoured by a strong breeze from the S.W., we made good progress during the next two days, and by noon on the 9th we had reached the latitude of 52° 32′ S. and longitude 161° 20′ W. The magnetic dip had increased to 70° S., and the variation was 15° 10′ E. The breeze increased to a strong gale soon after noon, with rain and occasional snow squalls, which reduced the temperature of the air from 42° to 34° during their continuance,—the barometer falling quickly to 29·1 inches at midnight. It was a severe night, and felt more so by us from the suddenness of the change of both the temperature and weather. As we had no apprehension of meeting ice in so low a latitude, we pursued our course before the gale, although the snow fell so thickly at times, that we could not see more than a quarter of a mile before us. Dec. 9.

The gale which continued throughout the next day, shifted to the south-eastward in the afternoon, and reduced us to close-reefed topsails; the change of wind brought clear weather, but prevented our getting so near to the Nimrod Islands as I wished. At noon we were in lat. 53° S. and long. 157° 49′ W.; the islands, therefore, bore S. 6° W., 212 miles from us, which was the nearest approach to them we Dec. 10.

1841. were able to make. Our observations proved that for the last few days we had been carried to the S. 60° E. by a current, at the rate of fifteen miles daily, similar to that we detected between Kerguelen Island and Van Diemen's Land, and which probably circulates round the globe in a belt of about five degrees on each side of the 50th parallel of south latitude.* We still continued to meet with patches of seaweed, and the birds I have before enumerated. To-day a great number of grampuses were seen and a few whales.

As we were now getting near the latitude in which, from our former observations, we might expect to cross the circle of uniform temperature of the ocean, our experiments for the determination of this interesting point in physical geography were made at every opportunity: and, according to our expectation, we reached it on the 13th, in latitude 55° 18′ S., longitude 149° 20′ W. Unfortunately it was blowing too fresh for us to obtain the temperatures below six hundred fathoms: at that depth it was 39°·7; at 450 fathoms, 39°·7; at 300 fathoms, 39°·9; at 150 fathoms, 39°·6; and at the surface, 39°. I have no doubt, that had we been able to measure the temperature to several thousand fathoms, we should have found it not to differ to the amount of one degree throughout the whole depth.

Dec. 14. The next day proving more favourable for the purpose, thermometers were sent down to one

* See Appendix, Vol. I. p. 333.

thousand two hundred fathoms, and recorded a temperature of 39°·7, between that depth and three hundred fathoms; at 150 fathoms it was 38°; that of the surface having fallen to 35°·8; the effect of radiation of heat from the ocean, therefore, extended to the depth of more than 150 fathoms, proving clearly that we were to the southward of the circle of uniform temperature. Our position at this time was, lat. 56° 20′ S., long. 148° 8′ W. In the forenoon we had crossed a line of ripple, lying in a north and south direction, but our trial of the current failed from mismanagement, and the weather becoming densely foggy, it was not repeated. We also passed a small piece of sea-weed, the last trace of vegetation we saw in our way to the south, and therefore worthy of notice, more especially as we were now in the latitude where we might expect to meet floating ice. 1841.

Although the fog was very thick all night, and the wind light from the N. E., yet we contrived to keep company by firing muskets, sounding the gong, or ringing the bell; and had thus an opportunity of judging the relative value of these three methods usually employed as fog signals.

To us the bell was most distinct, and the gong very little inferior, when the musket was scarcely audible; but I was much surprised, at this time, on hailing through a speaking-trumpet, to receive an immediate and so clear an answer from the officer of the watch of the Terror, that we might have carried on a conversation.

1841. Dec. 15. A dense fog prevailed throughout the whole of the following day; we were now nearly a hundred miles to the southward of where Cook and Biscoe met with icebergs, still we proceeded on our course with confidence, the temperature of the sea being 36°. In the afternoon a boat was lowered down to try the current, which we found setting S. E., at the rate of fifteen and a half miles daily. The barometer rose steadily, notwithstanding which the fog was so thick, that although we could hear the voices of those on board the Terror, and every order that was given, we could not see the vessel. Towards midnight the temperature of the sea fell rather suddenly, to below 34°,
Dec. 16. and at 5^h 30^m A.M. two icebergs were seen, and at 6^h a third berg, right ahead of us. The fog had cleared away for a short time, which enabled us to see the bergs: and, in passing within half a mile of the largest, the temperature of the sea was rather below 33°.

The height of this berg was one hundred and thirty feet, and its circumference three quarters of a mile. It was one of the table-topped, or barrier kind, and deep caverns had been worn into its vertical sides by the action of the sea: a long line of loose pieces extended several miles to leeward of it, and many large masses appeared ready to fall from it, to continue the line of fragments, as the others drifted away before the wind.

At noon we were in latitude 58° 36′ S., longitude 146° 43′ W. The magnetic dip had increased to

73° 23′ S., and the variation 14° 40′ E. It is a curious fact, that although we caught numerous marine mollusca in the towing net yesterday, it was not until we got near the bergs that the beautiful diminutive argonaut (Argonauta arctica) of the Arctic seas was taken. Cape pigeons were now become more numerous, and the large albatross more rare. The sooty albatross was still seen in considerable numbers, as were also the dark and the blue petrel. 1841.

In the afternoon we hove to, and tried the temperature of the sea, to the depth of six hundred fathoms; after which we bore away under more moderate sail; the fog being very thick, great vigilance was necessary during the night, whilst running seven knots, to avoid bergs and enable the Terror to keep company.

As we had now attained that meridian on which I intended to penetrate to the antarctic seas, our course was changed to due south, which was also the most favourable for determining the situation of the several lines of equal magnetic intensity, leading directly across them; our observations had by this time shown that the supposed position of the second focus of greater intensity in this hemisphere was very distant from the truth, and that that point had yet to be sought far to the south.

But my chief object in selecting this meridian was the hope that it would lead to the discovery of land, which I was led to expect by reason of the low

1841. latitude in which the ice had been met with by former navigators,—at any rate, I thought it better to attain the eastern point of the great southern barrier, at which our operations last year had been interrupted by the setting in of the winter, by a route as widely different as practicable from that by which we had before approached it; and thus enlarge the boundary of our examination of those regions.

Dec. 17. We passed only a few icebergs during the night, but many very heavy loose pieces, doubtless fragments of broken-up bergs, sufficiently large to destroy any ordinary ship that might strike against them, at the rate we were sailing; the fog had, however, in some degree cleared away, and having no difficulty in avoiding them, we had a fine run. The snow showers which followed in the morning were only of short continuance, and during the longer intervals of clear weather, we could see to a great distance from the mast-head.

At noon we were in lat. 61° 3′ S., long. 146° 3′ W. We had, therefore, passed beyond the track of the Russian navigator, Bellinghausen, upon this meridian, and were fast approaching that of Cook, in 1774.

Some whales, numerous gray petrel, and Cape pigeons were seen. At 5 P.M. a strong iceblink appeared in the sky to the S. E.; the temperature of the sea also falling to 29° at midnight, gave notice of our approach to a large body of ice: and at three o'clock the following morning the

main pack was seen stretching across our course, from east to west. At this time there were forty large bergs in sight. 1841. Dec. 18.

All the circumstances appearing favourable, we at once ran into the pack, and at first made good way through it, the ice being remarkably light and very open; but as we proceeded south it became heavier, and more strongly pressed together, until, after having penetrated about thirty miles, we were obliged to steer more to the westward, availing ourselves of every opportunity of resuming our southerly course when the ice permitted. We were at noon in lat. 60° 50′ S., long. 147° 25′ W.; and the magnetic dip had increased to 76° S., the variation to nearly 19° E.

Immediately upon entering the ice we found the temperature of the sea 28°, that of the air being 32°; and for the first time the beautiful snow-white petrel and the gigantic petrel were seen, also a few whales of the finner kind, and some small seals were basking on the ice.

As we advanced through the pack during the rest of the day, we observed the ice to be very much stained in some places, and upon examination we found it to be caused by matter of a yellowish colour, similar to that we had met with off Mount Erebus, and which led me to suppose it to be aluminous or other minute crystals ejected from that volcano. It has been since ascertained by that eminent naturalist Ehrenberg, whose wonderful researches with the microscope have detected large

1841. mineral masses and extensive formations, composed wholly of the remains of microscopic animalculæ, that this colouring matter consisted of countless myriads of an entirely new and minute form of organic life, which he observes arrived at Berlin, in 1844, in a living state, and of which "almost all the separate atoms are independent siliceous-shelled creatures."* We also found this colouring matter in the stomachs of the small Beroe and other molluscous animals we took in the net, which therefore feed upon these infusoria.

In the evening many whales were seen amongst the ice, and were so tame that the ship struck upon one in passing over it, without having done it any harm, although a shock was felt, but whether from the force with which the vessel struck the whale, or from a blow of its tail, given in return, we could not know.

Dec. 19. The wind was moderate from the south-eastward, and the weather clear, but the ice to the southward so close that we were obliged to run more to the westward than we wished, forcing our way from hole to hole as they came in sight from the masthead, and keeping as much to the southward as possible until noon, when our progress was interrupted by the closeness of the pack. I took this early opportunity of obtaining magnetic observations on a large floe of ice, for the purpose of ascertaining whether the corrections we em-

* See Appendix to Vol. I., p. 342.

ployed for the effect of the ship's iron were still to be depended upon. We were at this time in latitude 63° 23′ S., longitude 149° 58′ W., having penetrated the pack nearly one hundred miles in a south-west direction. The magnetic observations on the ice agreed very satisfactorily with those made on board the ships; by them we found the magnetic dip to have increased to 77° 23′ S., and the variation to 20° 2′ E.; on board the Erebus the dip was 77° 25′ S., the variation 20° 14′ E. 1841.

The ice slackened in the afternoon, and we pushed the ships nearly twenty miles further to the S. S. W. by midnight, when we were again stopped.

We made considerable progress next morning, Dec. 20. by taking advantage of every opening that occurred, although the thick fog, which came on early in the forenoon, prevailed throughout the day. Numerous whales, seals, Cape pigeons, and white petrel were seen, and two or three flocks of an elegant little tern were observed flying to the south-westward. At noon we were in lat. 63° 47′ S., long. 151° 34′, W.; in the course of the afternoon, the ice again closed, and prevented our getting any further; we tried for soundings, and struck ground in one thousand seven hundred fathoms. The temperature of the sea at 900 fathoms was 39°·8; at 750 fathoms, 39°·6; at 600 fathoms, 40°; at 300 fathoms, 38°·4; at 150 fathoms, 35°·6; and at the surface, 30°. The experiment at 450 fathoms failed through an acci-

1841. dental blow the thermometer received; but it is quite clear from that at 300 fathoms, that the mean temperature of the ocean in this latitude is about six hundred fathoms beneath the surface. We did not repeat the experiment as the ice opened, and allowed us to make some way to the southward through it; and those who wish to penetrate an extensive pack, must never miss any opportunity, however trifling, that may present itself, for it is always difficult to know how far it may lead you, or if neglected, how irretrievable may be the loss. Whilst we were hove to, three seals were killed on the ice and brought on board; they offered no resistance, and did not seem to apprehend any harm from our people, whom they suffered to approach near enough to knock them on the head with bludgeons; in the stomach of one of them were about nine pounds in weight of granite stones, which we imagined it must have got from off the floating ice, as we knew of no land within a thousand miles of us; in the stomach of another were the mutilated remains of some fish about the size of a herring, and in all of them great numbers of a large red shrimp, which appears to constitute their chief food.

Dec. 25. During the next few days we were much embarrassed by fogs and light winds, chiefly from the eastward, and made but little progress in the desired direction, so that we found ourselves on the twenty-fifth in latitude 66° S. and longitude 156° 14′ W., and passed our Christmas-day, closely

beset in the pack, near to a chain of eleven bergs, 1841.
of the barrier kind, and in a thick fog the greater part of the day, with by no means a cheering prospect before us; we, nevertheless, managed to do justice to the good old English fare, which we had taken care to preserve for the occasion.

The wind shifted early in the day to the north- Dec. 26.
ward, and towards the evening increased to a strong breeze, accompanied with thick weather and snow; we were at this time in a large hole of clear water, but were not able to find any way out of it to the southward; and as this unfavourable weather continued for some days, we could do nothing more than dodge about from side to side, or occasionally run along the edge of the hole, under easy sail, manœuvring the vessels so as to keep them from getting beset, and ready to take advantage of any favourable change that might occur of pushing through the pack to the south-
ward. On the evening of the thirtieth, it became Dec. 30.
quite calm and the ice spread out so as to shut up the hole we were in, but without opening sufficiently to admit of our making any way through it, when a light air sprung up from the northward. We, therefore, made our ships fast to the largest piece of ice we could get hold of, mooring it between the ships to prevent their coming into collision with each other, and employed our crews in filling the water tanks with ice from the floe, the small pools of water which we found on it being too brackish to drink.

1841. The northerly wind had brought with it a remarkable elevation of the temperature of the air, the thermometer rising to 40° at noon. We were at this time in latitude 66° 30′ S., and had, therefore, not yet crossed the Antarctic Circle; and during the last week we had not made more than thirty miles of southing, in the longitude of 156° 19′ W.: the magnetic dip 80° 26′ S., and the variation 25° 36′ W.

Dec. 31. The calm, with thick fog and snow, continued throughout the day, and our ships remained fast to the piece of ice between them; we could perceive by the bergs we were drifting very slowly to the southward, and the year closed upon us under as unpromising appearances as can be imagined. During the day many seals and white petrel, a few of the gigantic petrel, one entirely white, and a pair of the rapacious Skua gull, were seen.

We took advantage of the opportunity which this unlooked-for detention afforded us of obtaining a careful comparison of the magnetic instruments of the two ships, and were gratified to find they maintained their usual exactness of accordance.

Experiments in the temperature and specific gravity of the ocean, at various and considerable depths, were also made; and as they gave occupation to our crew, so they served, in some measure, to relieve the tedious and wearisome hours of our imprisonment and inactivity. The pack in which we were involved consisted, for the most part, of heavy floe ice, which had been much broken

up, and pressed and heaped together so as to form 1841.
the most irregular-shaped masses: severe, indeed, must have been the pressure at some period, as not a single level floe could be seen amongst it, and it seldom happened that we met with any piece exceeding a quarter of a mile in circumference, thus presenting a striking difference of character in the pack of the Antarctic from that of the Arctic Sea, where floes of several miles in diameter are of common occurrence, and sometimes "fields" as they are termed, whose boundary is beyond the reach of vision from a ship's mast head. The cause of this is explained by the circumstance of the ice of the southern regions being so much more exposed to violent agitations of the ocean, whereas the northern sea is one of comparative tranquillity.

1841.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—DECEMBER, 1841.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temp. at 9 A.M.	
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in shade	Dew point.
	°	°	°	°	°	°	°	°
1	45·40	176·41	58·5	52·5	55·9	53·3	56	53
2	47·21	175·23	57	51	53·4	52·3	54	46
3	48·47	173·36	57	48	51·0	51·7	51	45
4	49·24	172·24	55	47	49·7	52·2	49	41
5	49·27	170·47	58·5	47	51·5	50·5	50	39
6	50·01	168·40	59	48	51·6	49·6	50	44
7	50·48	167·40	51	45	47·2	47·4	48	44
8	51·36	165·28	49	43·5	45·7	47·8	46	40
9	52·32	161·20	41·5	36	39·9	46·2	40	34
10	53·01	157·49	42·5	37	40·5	45·6	40	40*
11	52·50	156·08	45	38	41·4	44·6	41	34
12	53·12	154·21	51	41	44·7	42·6	44	40
13	54·56	150·30	46·5	40	42·5	39·0	41	41*
14	56·20	148·08	48	35	41·0	36·6	40	40*
15	57·06	147·40	42	34	37·5	35·4	38	38*
16	58·36	146·43	40	33	35·6	33·1	35	34
17	61·03	146·03	35	28·2	31·8	31·0	33	27
18	62·50	147·25	36	28	30·6	28·5	31	29
19	63·23	149·58	39	27	31·1	28·8	32	29
20	63·47	151·34	29	27	27·7	29·4	29	27
21	64·50	153·23	33	26·5	29·2	30·4	31	31*
22	65·30	154·19	34	23·5	27·7	29·3	28	28*
23	65·59	155·44	33·8	22·5	27·5	28·8	29	26
24	65·58	155·54	33	26	29·9	29·2	31	27
25	66·01	156·11	37	27·5	31·0	29·1	34	27
26	66·09	156·23	31	27	28·7	28·5	29	26
27	66·16	156·29	34	28·5	30·5	28·4	31	31*
28	66·20	156·38	37	29·5	32·3	28·8	32	32*
29	66·24	156·09	35	29·8	31·8	28·9	32	32*
30	66·31	156·19	42·5	30	33·8	28·8	32	32*
31	66·29	156·49	43·5	29	35·2	28·8	35	35*
			59	22·5	38·48	37·63	38·5	35·2

* Deposit of rain, fog, or snow.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—DECEMBER, 1841.

1841.

Day.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	30·275	29·761	30·030	N.E.	4	A.M. 0 g.m.* P.M. 3 b.c.g.
2	·410	30·254	·351	N. E.	4	2 b.c.g.q.
3	·416	·285	·367	N.E. by N.	2	A.M. 0. P.M. 1. b.c.g.
4	·279	·011	·138	N.N.E.	1	0 g.
5	·011	29·830	29·936	W. by N.	A.M. 1 P.M. 3	0 / 2 b.c.
6	29·825	·636	·722	North	2	2 b.c.g.
7	·697	·604	·647	N.E.	2	2 b.c.o.g.
8	·660	·410	·541	Northerly	3	2 b.c.q.d.
9	·391	·115	·283	S.S.W.	A.M. 4 P.M. 6	2 b.c.p.q.s.h.
10	·575	·134	·341	Southerly	6	4 b.c.q.r.
11	·861	·606	·789	S.S.E.	2	1 b.c.g.
12	·848	·664	·777	W.N.W.	A.M. 2 P.M. 4	0 / 0 g.d.
13	·625	·388	·473	N.W.	4	0 d.f.
14	·380	·294	·322	N.W. by N.	2	0 d.f.
15	·417	·335	·380	N. Easterly	1	0 d.f.
16	·563	·410	·486	N.N.E.	3	0 f.
17	·797	·564	·683	E.N.E.	A.M. 4 P.M. 3	0 g.p.s.
18	·956	·798	·883	E.S.E.	2	A.M. 0 g. P.M. 3 b.c.g.
19	·988	·941	·965	S.E. by E.	2	A.M. 2 b.c.g. P.M. 4 b.c.
20	·963	·838	·901	S.E. by E.	2	0 g.f.
21	·833	·755	·794	E. by S.	A.M. 3 P.M. 1	0 m.p.s. / 4 b.c.f.
22	·910	·793	·837	E.S.E.	2	A.M. 3 b.c.f. P.M. 0 m.p.s.
23	·992	·927	·961	E.S.E.	1	0 g.p.s.
24	30·009	·971	·990	E.S.E.	2	0 g.
25	29·976	·749	·875	N.E.	2	0 g.p.s.
26	·732	·395	·559	N.E.	4	0 g.p.s.
27	·366	·181	·245	N.E. by N.	A.M. 4 P.M. 1	0 p.q.s. / 0 f.
28	·222	·135	·185	W. by N.	1	A.M. 0 f.r. P.M. 0 f.
29	·133	28·939	·004	Northerly	1	0 m.d.
30	·096	29·001	·047	Northerly	1	A.M. f.d. P.M. f.
31	·146	·071	·091	N.N.W.	1	f.p.s.
	30·416	28·939	29·6646		2·42	

* For explanation of these symbols, see Appendix to Vol. I.

Mode of pushing through the Pack during a Fog. Page 167.

CHAPTER VI.

Cross the Antarctic Circle. — Driven back to the Northward. — The Great Penguin. — Seals. — Fish. — Animal Life. — Beset in the Pack. — Gale in the Pack. — Perilous Situation of the Ships. — Damages sustained during the Gale. — Repair Damages. — Closely beset in the Pack. — Meteorological Abstract for January.

CHAPTER VI.

NOTWITHSTANDING the inauspicious circumstances in which we were placed, the arrival of the new year was hailed by us all with the same feelings of confident hope and cheerfulness which had animated our exertions throughout the last season's operations in these regions: and although we had found the pack to extend much farther to the northward than on the former occasion, and were at this time beset in so dense a portion of it, that not the least hole of water could be seen amongst it, presenting to our view an apparently impenetrable mass, as far as the eye could discern from the mastheads of our ships, yet we were encouraged to hope that the clear water was at no great distance to the southward of us; for we found the ice in which we were enclosed continue to move to the northward before every southerly breeze: it must therefore have left clear water at the place it originally occupied, and from which it was drifting. We had already advanced two hundred and fifty miles through the pack; and from its breadth last season, not much exceeding two hundred miles, we could not but expect to be soon released, and enabled to renew our exploration at the point of the barrier where we had left off last year. Our observations to-day at

1842.

Jan. 1.

1842. noon placed us in latitude 66° 32′ S., longitude 156° 28′ W., we therefore crossed the Antarctic circle this season on the same day that we did last year, and forty degrees of longitude, or about fourteen hundred miles to the eastward.

A complete suit of warm clothing was issued to our crews, as a new year's gift, and the customary double allowance of provisions and spirits was served out to them. As the state of the ice prevented our making any attempt to proceed, we remained moored to the large floe piece we had hold of, and the day was spent by our people in the enjoyment of various amusing games on the ice, which their ingenuity invented, and which was finally wound up by a grand fancy ball, of a novel and original character, in which all the officers bore a part, and added much to the merriment and fun which all seemed greatly to enjoy; indeed, if our friends in England could have witnessed the scene, they would have thought, what I am sure was truly the case, that we were a very happy party.

The pack continued so close, that we could make no way through it; but found by our observations we had been carried a few miles to the southward on the second, and again back to the northward,
Jan. 3. and to-day at noon our latitude was 66° 34′ S., and longitude 156° 22′ W. The temperature of the sea was found to be 39·6° at one thousand and fifty fathoms, whilst at the surface it was only 28°. It was also tried at intermediate depths, at intervals

of one hundred and fifty fathoms, and found progressively to increase from the surface to the greatest depth. 1842.

On the next day the wind changed to the southward, and freshened to a strong gale; we found ourselves drifting with the pack fast back to the northward, so that at noon on the 5th our latitude was 66° 15′ S. All this day we continued to drift along with the ice; but towards midnight we observed some holes of water opening out amongst it to the southward, and the wind changing to the eastward soon after noon, we cast off from the floe, and regained eight or ten miles of our lost ground before we were again stopped by the close pack, which extended to the southward. We kept the ships free by beating about in the largest hole of water we could find, but not without much difficulty, owing to thick snow coming on, and preventing our seeing to any distance. Jan. 4. Jan. 5. Jan. 6.

Early the next day the breeze freshened rapidly, and a gale came on from the westward, but it only lasted about twelve hours, and was followed by a strong southerly breeze. During the gale our ships received some very heavy blows, but I was anxious to prevent them getting beset; and although the labour of tacking or wearing every quarter of an hour, with our decks and rigging encumbered with ice and snow, was great, and required the unceasing exertions of the officers and crew, the work was continued with cheerfulness and alacrity throughout this and the two following days; whilst a Jan. 7.

1842. southerly gale which succeeded, blew without intermission during the whole of the 8th and 9th, sweeping us away back to the northward with the pack, in spite of all our efforts to maintain our southing.

Jan. 10. The 10th was a comparatively fine day, and the wind being moderate from the southward, we were able to regain some of the ground we had lost, but at noon had the mortification to find ourselves in latitude 65° 59′. The ice had spread more out in the afternoon, and we passed a great quantity, or rather allowed it to drift past us; for although, according to our reckoning, we had made at least twenty miles, by beating to windward amongst the ice, we found by our observations at

Jan. 11. noon the next day, that instead of having increased our latitude, we were actually a mile to the northward of our position of yesterday. We had, however, the consolation of knowing that we should have twenty miles less of the pack to pass through before reaching the clear water, which must have opened out to the southward.

During the last few days we saw many of the great penguins, and several of them were caught and brought on board alive; indeed it was a very difficult matter to kill them, and a most cruel operation, until we resorted to hydrocyanic acid, of which a tablespoonful effectually accomplished the purpose in less than a minute. These enormous birds varied in weight from sixty to seventy-five pounds. The largest was killed by the Terror's

people, and weighed seventy-eight pounds. They 1842.
are remarkably stupid and allow you to approach them so near as to strike them on the head with a bludgeon, and sometimes, if knocked off the ice into the water, they will almost immediately leap upon it again as if to attack you, but without the smallest means either of offence or defence. They were first discovered during Captain Cook's voyage to these regions, and the beautiful unpublished drawing of Forster the naturalist, has supplied the only figures and accounts which have been given to the public, both by British and foreign writers on natural history. Mr. Gray has, therefore, named it in the zoology of our voyage, Aptenodytes Forsteri, of which we were fortunate in bringing the first perfect specimens to England. Some of these were preserved entire in casks of strong pickle, that the physiologist and comparative anatomist might have an opportunity of thoroughly examining the structure of this wonderful creature. Its principal food consists of various species of cancri and other crustaceous animals; and in its stomach we frequently found from two to ten pounds' weight of pebbles, consisting of granite, quartz, and trappean rocks. Its capture afforded great amusement to our people, for when alarmed and endeavouring to escape, it makes its way over deep snow faster than they could follow it: by lying down on its belly and impelling itself by its powerful feet, it slides along upon the surface of the snow at a great pace,

1842. Jan. 11.

steadying itself by extending its fin-like wings which alternately touch the ground on the side opposite to the propelling leg. The most successful of our hunters were Mr. Oakley and Mr. Abernethy, as they were also in the capture of the seals which we met with in no great numbers. These were of three kinds: the largest of them is of great size, measuring in length nearly twelve feet, and six feet in circumference, but varying very much in weight according to the condition of the animal; the heaviest we killed weighed eight hundred and fifty pounds, and yielded upwards of sixteen gallons of oil. In the stomach of one which we caught we found twenty-eight pounds weight of fish. With the *single* exception of a single specimen of a *Sphyræna*, they all belonged to a species of the new genus discovered at Kerguelen Island, and named *Notothenia* by Dr. Richardson.* They were in various stages of decomposition: some few, which appeared to have been only just taken, furnished subjects for preservation, and of which careful drawings were made by Dr. Hooker. The average length of this fish, so interesting from the high latitude it inhabits, was six and a half inches, and its weight two and a half ounces; there must therefore have been nearly two hundred individuals contained in the stomach of this seal. As it proved to be a species distinct from

* Zoology of the Voyage of the Erebus and Terror, Part II. p. 8.

those we found at Kerguelen Island, it has been named Notothenia Phocæ, from the circumstances in which it was first found. 1842.

They occupy the place of the *Merlangus Polaris* and Ophidium Parryii of the arctic seas, the latter of which they much resemble; like them they conceal themselves from the persecutions of their enemies in the small cracks and cavities of the pack ice, and may be seen when driven from shelter by the ship striking and passing over their protecting pieces of ice.* The seals and petrels are their chief enemies, whilst they, in their turn, live upon the smaller cancri and limacinæ. Thus we behold, in these regions, where the vegetable kingdom, which constitutes the support of animal life in milder climates, has no representative, a chain of animal existences, maintained by each preying upon that next below it in the order of created beings, and all eventually nourished and sustained by the minute infusorial animalcula which we found filling the ocean with an in-

* The Sphyræna was in too mutilated a state to determine its specific characteristics; its head, although broken into numerous fragments, proved to be identical with one which the master of a whaler found on the beach at New Zealand, but we could not ascertain to what fish it belonged. It is considered by Dr. Richardson to be of the genus Alepisaurus, but differing from the A. ferox which inhabits the coasts of the island of Madeira. It is, nevertheless, a most ferocious looking fish; and, although we are unable to supply a description sufficient for its specific distinction, there is no doubt of its being an entirely new species. Its long narrow body measured twenty-eight inches in length.

1842. conceivable multitude of the minutest forms of organic life.

There is considerable variety in the colour of each of the three species of seals, from a dark gray, beautifully marbled with spots and stripes of a much deeper colour, to almost uniform white, depending, doubtless, in a great degree upon the age of the individual.

The largest-sized seal is less numerous than the smaller species, and is armed with enormous tusks, fully as large and strong as those of the polar bear, to which also the shape of the head bears a very strong resemblance. It should be attacked with caution; for, although awkward and unwieldly on the ice, it has both the inclination and the means of inflicting severe wounds, and is, therefore, a formidable creature to engage.

The middle-sized seal, called the sea leopard, and the white antarctic seal, may be easily knocked on the head without the smallest personal danger; from the severely wounded state in which we found some of the males, having long and deep gashes along their sides and backs, from which in a few instances the blood was still flowing, they must have fierce battles with each other at this period of the year.

They are, however, not in sufficient numbers to induce our merchants to send to these regions after them; had it been our sole object we might have taken twenty or thirty every day; but, as on an average the largest yield only sixteen, the middle-

sized only ten, and the smallest not more than five gallons of oil, their skins also being of but little value, it would not prove a very profitable speculation unless a place could be found where they congregate together in far greater numbers. The whales which we saw here, though of large size, were by no means so numerous as we found them in other parts of the antarctic regions. 1842.

In the forenoon, the wind falling light and the hole of water in which we had been working having become too small for us to sail about in any longer, we made the ships fast to the largest piece of ice we could find, mooring it between them. As the wind prevailed from the southward, the whole body of the pack still drifted to the northward as we could perceive by the larger bergs, which, not being so easily affected by the wind, moved at a much slower pace. Cape pigeons and white petrels were the only birds we saw to-day, except a flock of tern flying to the southwestward. Jan. 11.

Early in the morning we observed the ice opening, so we cast off, and, aided by a light southeasterly wind, made way to the south-westward, in which direction we rejoiced to observe the sky much darker than we had before seen it, and which we believed to be hanging over a large space of water. At noon we were in lat. 65° 54′ S., long. 156° 30′ W. Our boats were kept ahead, towing through the openings in the ice, and preventing the ships striking against the heavier pieces of Jan. 12.

1842. ice, there not being sufficient wind to navigate amongst it without their assistance. In the evening the wind increased, and veering to the N. E., rendered this laborious work no longer necessary, and we steered towards the dark water sky, which we hoped was to lead us through this tedious pack, in which we had now been involved four weeks of the precious period of the brief summer of these regions. The strong gales of last year were of more advantage to us than the light easterly breezes and comparatively fine weather we had enjoyed this season; it was therefore not unfrequent to hear the unusual wish expressed for a gale of wind to arise, by which alone could we expect the dense pack to be dispersed and our liberation effected.

Jan. 13. Boring our way through the pack under all sail during the night, we found at noon that we had gained nearly twenty miles of southing: but at this time we were again stopped by the ice becoming too close for us; we accordingly availed ourselves of a small clear space, in which to keep the ships free, so as to be ready to make the best of the first opening that appeared. To break through an intervening belt of ice required some hours hard labour with poles and warps, and was no sooner accomplished than the wind freshened suddenly from the eastward, and greatly increased the size of the hole, so that we could dodge about in it under easy sail, and watch the effects of the breeze upon the pack which surrounded us.

1842.

Jan. 14.

We remained shut up in this hole of water the whole of the next day, without being able to perceive the smallest change in the ice, which would admit of our advancing to the southward; there was considerable motion amongst it, and we observed by the bergs that the whole body was drifting to the northward. We were visited by the various kinds of birds I have so often enumerated; and, in addition to those, a stormy and three dusky petrels were seen, as was also an individual of the gigantic kind, entirely white, and at first mistaken for a new bird.

Jan. 15.

The hole in which we were confined becoming too small, being not more than half a mile in diameter, for our ships to keep under sail in, without the probability of their coming into collision, rendered it necessary to make fast to a large floe piece we found convenient for our purpose, and during the day we employed our people filling the empty water tanks with ice, and other useful operations.

Jan. 16.

The pack remained perfectly close in every direction, without the smallest hole of water to be seen amongst it; but still the dark water sky to the southward remained in encouraging strength. As the wind was blowing from the southward, we drifted back with the pack to the northward, and at noon we were in latitude 65° 48′ S., and longitude 157° 36′ W. All the circumstances being favourable for the purpose, I went on the ice to make magnetic observations in the evening, chiefly with the view of ascertaining whether the

1842. corrections we applied to those taken on board our ship remained unchanged, and if not, to afford the means of deducing accurate corrections.

There was a gentle swell from the westward, which kept the instruments in motion, not sufficient, however, to vitiate the observations in the slightest degree; and the wind having died away, so that a perfect calm prevailed, an extensive and satisfactory series was obtained, which gave equally satisfactory results: the magnetic dip was found to be 79° 39′·5 S., and the variation 25° 15′ East.

Jan. 17. During the night the swell from the westward greatly increased, and the pack being quite close and heavy, our ships sustained at times some severe blows from the ice, while the rapidly descending barometer warned us of an approaching gale.

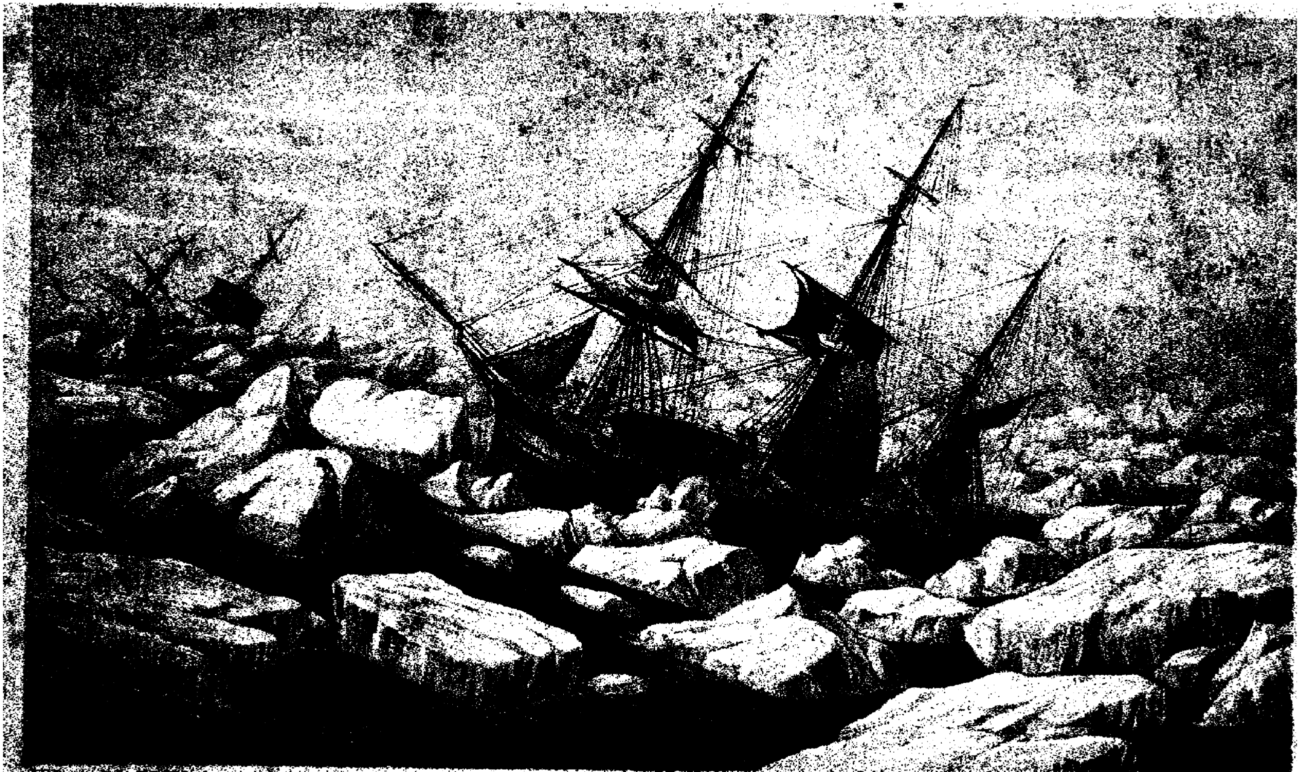
Towards the evening the sea had gained such a height, that our eight-inch hawsers were not strong enough to hold us to the heavy floe—snapping one after the other so fast that we had scarcely time to replace them with ropes of larger size; the wind had increased to a gale from the north-eastward, and blew violently throughout the night and during the forenoon of the next day, but it had the effect of subduing the westerly swell, and of driving us towards the south-west water.

Jan. 18. A dense fog prevailed, and the snow, which fell thickly, was converted into rain by the temperature

of the air rising to 34° in the afternoon, and the wind had greatly moderated by 5 30 P.M., when we observed a very large berg close under our lee. All sail was immediately set upon both ships, and we cleared this danger by only a few feet, the spanker boom of the Erebus touching it as we were driven past its western end; the sea was breaking against its perpendicular face with so much violence that some of the spray fell on board the ships. 1842.

To prevent the ships separating during the fog, it was necessary to keep fast to the heavy piece of ice which we had between them as a fender, and, with a reduced amount of sail on them, we made some way through the pack: as we advanced in this novel mode to the south-west, we found the ice became more open, and the westerly swell increasing as the wind veered to the N. W. at midnight, we found it impossible any longer to hold on by the floe piece. All our hawsers breaking in succession, we made Jan. 19. sail on the ships, and kept company during the thick fog by firing guns, and, by means of the usual signals: under the shelter of a berg of nearly a mile in diameter, we dodged about during the whole day, waiting for clear weather, that we might select the best leads through the dispersing pack; but at 9 P.M. the wind suddenly freshened to a violent gale from the northward, compelling us to reduce our sails to a close reefed main-top-sail and storm stay-sails: the sea quickly rising to a fearful height,

1842. breaking over the loftiest bergs, we were unable any longer to hold our ground, but were driven into the heavy pack under our lee. Soon after midnight our ships were involved in an ocean of rolling fragments of ice, hard as floating rocks of granite, which were dashed against them by the waves with so much violence that their masts quivered as if they would fall at every successive blow; and the destruction of the ships seemed inevitable from the tremendous shocks they received. By backing and filling the sails, we endeavoured to avoid collision with the larger masses; but this was not always possible: in the early part of the storm, the rudder of the Erebus was so much damaged as to be no longer of any use; and about the same time I was informed by signal that the Terror's was completely destroyed, and nearly torn away from the stern-post. We had hoped that, as we drifted deeper into the pack, we should get beyond the reach of the tempest; but in this we were mistaken. Hour passed away after hour without the least mitigation of the awful circumstances in which we were placed. Indeed, there seemed to be but little probability of our ships holding together much longer, so frequent and violent were the shocks they sustained. The loud crashing noise of the straining and working of the timbers and decks, as she was driven against some of the heavier pieces, which all the activity and exertions of our people could not prevent,



Day & Haghe Lith to the Queen.

was sufficient to fill the stoutest heart, that was not supported by trust in Him who controls all events, with dismay; and I should commit an act of injustice to my companions if I did not express my admiration of their conduct on this trying occasion; throughout a period of twenty-eight hours, during any one of which there appeared to be very little hope that we should live to see another, the coolness, steady obedience, and untiring exertions of each individual were every way worthy of British seamen. 1842.

The storm gained its height at 2 P.M., when the barometer stood at 28·40 inches, and after that time began to rise. Although we had been forced many miles deeper into the pack, we could not perceive that the swell had at all subsided, our ships still rolling and groaning amidst the heavy fragments of crushing bergs, over which the ocean rolled its mountainous waves, throwing huge masses one upon another, and then again burying them deep beneath its foaming waters, dashing and grinding them together with fearful violence. The awful grandeur of such a scene can neither be imagined nor described, far less can the feelings of those who witnessed it be understood. Each of us secured our hold, waiting the issue with resignation to the will of Him who alone could preserve us, and bring us safely through this extreme danger; watching with breathless anxiety the effect of each succeeding collision, and the vibrations of the tottering masts, expecting

1842. every moment to see them give way without our having the power to make an effort to save them.

Although the force of the wind had somewhat diminished by 4 P.M., yet the squalls came on with unabated violence, laying the ship over on her broadside, and threatening to blow the storm sails to pieces: fortunately they were quite new, or they never could have withstood such terrific gusts. At this time the Terror was so close to us, that when she rose to the top of one wave, the Erebus was on the top of that next to leeward of her; the deep chasm between them filled with heavy rolling masses; and as the ships descended into the hollow between the waves, the main-topsail yard of each could be seen just level with the crest of the intervening wave, from the deck of the other: from this some idea may be formed of the height of the waves, as well as of the perilous situation of our ships. The night now began to draw in, and cast its gloomy mantle over the appalling scene, rendering our condition, if possible, more hopeless and helpless than before; but at midnight, the snow, which had been falling thickly for several hours, cleared away, as the wind suddenly shifted to the westward, and the swell began to subside; and although the shocks our ships still sustained were such that must have destroyed any ordinary vessel in less than five minutes, yet they were feeble compared with those to which we had been exposed, and our minds became more at ease for their ultimate safety.

During the darkness of night and the thick weather we had been carried through a chain of bergs which were seen in the morning considerably to windward, and which served to keep off the heavy pressure of the pack, so that we found the ice much more open, and I was enabled to make my way in one of our boats to the Terror, about whose condition I was most anxious, for I was aware that her damages were of a much more serious nature than those of the Erebus, notwithstanding the skilful and seamanlike manner in which she had been managed, and by which she maintained her appointed station throughout the gale. 1842. Jan. 21.

I found that her rudder was completely broken to pieces, and the fastenings to the stern-post so much strained and twisted, that it would be very difficult to get the spare rudder, with which we were fortunately provided, fitted so as to be useful, and could only be done, if at all, under very favourable circumstances. The other damages she had sustained were of less consequence; and it was as great a satisfaction as it has ever since been a source of astonishment to us to find that, after so many hours of constant and violent thumping, both the vessels were nearly as tight as they were before the gale. We can only ascribe this to the admirable manner in which they had been fortified for the service, and to our having their holds so stowed as to form a solid mass throughout.

1842. I was much gratified to learn from Commander Crozier, that the conduct of the officers and crew was most admirable; and certainly it is hardly possible to conceive a situation in which calmness and firmness were more necessary, or, I believe, more generally displayed.

The swell was now fast subsiding, the wind having changed to the S.W., and moderated to a fresh breeze with clear weather. On my return to the Erebus, we made more sail, and forced our way as far as we could into the thickest part of the pack, where, of course, we should find less motion; and, early in the afternoon, we got hold of a large floe piece, which we moored securely between our crippled ships; for without the aid of their rudders we found them too unmanageable to attempt to push through to the open water, whilst the ice to which we had attached them afforded facilities for their examination and repair, which could only have been accomplished in smooth water.

All hands that could assist the carpenters were now set to work, whilst as many as could be spared were sent below to get some rest, which all greatly needed, in order that a few might be refreshed and strengthened for any occasion that might require their further exertions. As we lay closely beset in the now almost motionless pack, our decks presented a scene of unusual character. The shattered rudder being hoisted on board, the car-

penters and their assistants were employed, setting 1842.
it straight, cutting away the splinters, and replacing the parts that had been torn away, whilst the armourers at the forge were engaged making bolts and hoops to bind all firmly together, and, by the unceasing labour of the officers and artificers, the Erebus's rudder was ready for shipping again before midnight.

The Terror's, as I have before said, was so completely destroyed as to oblige us to resort to her spare rudder, which was put together in less than an hour; but the ice was so closely pressed around us, that we could not see the nature of the damage the gudgeons had sustained, and which, being so far under water, were likely to present the greatest difficulty to getting her rudder so effectually secured as to render it practicable to pursue our way to the southward; and during the whole of the next day, the pressure of the pack still Jan. 22.
preventing our making any attempt to ship the rudders we had in readiness, all the artificers of both ships were employed making a spare rudder for the Terror, so as to provide against any future contingency. A cross-beam with two or three oak davits, added to those which the Terror could spare, afforded ample materials for this necessary work, and gave useful occupation to all hands.

The wind from the S.S.W. was all this time driving us with the pack back to the northward,

1842. and at noon we were in latitude 66° 39′ S., and longitude 156° 42′ W., so that after having exhausted five weeks of the best part of the season of navigation in what appeared to be, at this time, a fruitless attempt to get through this formidable pack, we found ourselves driven back to nearly the same spot we were at three weeks before. With only a brief period of the season remaining, our ships much strained, and some doubt on our minds as to the sufficiency of the rudders we had not yet tried, our prospects were by no means cheering; we had reason, however, to be thankful that we might still be enabled to go forward in the execution of the important duties with which we were charged.

By the evening the main pieces of the Terror's spare rudder were bolted together, and nothing but the filling pieces, and securing the braces and pintles was wanting to make it complete. But the labour of our people, particularly the carpenters and blacksmiths, had been almost incessant; I therefore directed that all work should be suspended after ten P.M., that they might get some rest, and resume their labours at an early hour the next morning, on which, although it was the Sabbath-day, I felt the necessity of departing from our practice of ceasing from work on that day, to complete a measure so essential to the safety of our ships.

Jan. 23. The wind continued moderate from the N.E.,

the weather, though gloomy, was favourable to our purpose, and we were again drifting in the desired direction. In the course of reading the usual church service in the morning, we offered up our most heartfelt thanksgivings to God for his merciful and wonderful preservation of us when we were in extreme peril, who had showed us the terrible things and wonders of the great deep, from which we might learn our own weakness, and his power and readiness to help all those that call upon and trust in Him, whose mercy is over all his works, but had been most especially manifested to us; and we implored a continuance of His blessing on all our future exertions. 1842.

In the evening, the ice slackened around our ship so much as to admit of our trying the anxious experiment of shipping the rudder, which we had the satisfaction of accomplishing without much difficulty; and, although the circumstances were not sufficiently favourable to do any thing with the Terror's, yet it was a relief to our minds to have one of the ships again in a condition, if necessary, to aid her more crippled companion.

The port or lee side of the Erebus, which had suffered most severely from grinding and striking against the ice, received our first attention: cutting away the splinters, and smoothening the surface as low down as we could by heeling the ship over to starboard, and then replacing, so far Jan. 24.

1842. Jan. 24. as we were able, the strong protecting metal plates that had been torn away: we were, nevertheless, greatly surprised at the unimportant extent of the damage.

After many fruitless attempts, and frequent alterations of the Terror's rudder, by much perseverance, and the patient ingenuity of her commander and senior lieutenant, it was firmly secured to the stern post by the evening of this day. The wind was blowing fresh from the N.E., and as we drifted to the S.W. again, we began to feel the effects of a westerly swell, which set in undulating motion the densely close pack by which we were surrounded. Our necessary works of repair were now drawing towards completion, and both the ships being again in a state of efficiency, we made all sail on them in the evening, so as to bore our way to the southward before the fresh northerly breeze that was blowing, but without casting off from our friendly floe.

Jan. 25. The wind fell light early this morning, and a thick fog, with small rain, prevented our seeing beyond two or three miles. The pack was so close, that although we kept all sail upon both ships, they did not draw a-head more than twice their own length in an hour; but of course the whole body was drifting to the southward, and, judging from the rate at which we passed the bergs, we estimated our drift at about twelve to fourteen miles in the twenty-four hours. This mode of

dead reckoning placed us at noon in lat. 66° 51′ S., long. 157° 13′, for we had had no observations for several days past, and it was a circumstance of general remark how seldom we had seen the sun during our long and harassing detention in this dense and extensive pack. 1842.

1842. ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS. — JANUARY, 1842.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temp. at 9 A.M.	
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air.	Dew point.
	° ′	° ′	°	°	°	°		
1	66 32	156 28	38	27·5	32·3	28·2	34·5°	32°
2	66 36	156 28	40·5	27	32·0	27·9	30·5	26
3	66 34	156 22	35·5	27	31·1	28·0	31	26·5
4	66 34	156 13	34·5	26	30·1	28·2	34	34 †
5	66 15	156 22	39	26·5	31·2	28·6	30	24
6	66 08	155 57	35·5	27·5	30·4	29·1	33	33 †
7	66 13	155 41	31·8	27	30·1	28·6	31	31 †
8	66 12	155 27	35	25	29·3	28·9	33	32
9	66 04	155 42	31·5	24·5	28·0	28·3	27	22
10	65 59	155 50	38·5	25	30·4	28·8	28	23
11	65 58	156 16	35·5	25	29·5	28·5	29	21
12	65 64	156 30	34	26	29·8	29·2	30·5	27·5
13	66 11	156 57	36	27·5	30·8	28·5	32·5	26
14	66 06	157 12	32	24·5	27·6	28·0	29·5	23
15	66 02	157 30	28	24·5	26·2	27·8	28	28 †
16	65 48	157 36	40	25·5	32·3	28·5	33	28·5
17	65 53	157 59	36·5	27	30·5	28·3	32·5	24
18	66 11	158 20	34	27·5	31·3	28·1	31·5	31·5 †
19	66 18	158 38	38	31	33·3	28·4	35	35 †
20	66 36	159 39	35	30	32·4	28·0	34	34 †
21	66 49	157 19	34	27	30·2	28·0	32	31·5
22	66 39	156 62	30	24·6	27·7	27·8	29·5	22
23	66 37	156 41	34	24	28·2	27·9	30	23
24	66 43	157 12	36·5	27·5	31·1	27·9	32	27·5
25	66 51	157 13	37	29	33·0	28·0	33	33
26	67 13	156 51	36	29·5	32·2	28·1	33	33 †
27	67 28	156 28	34	30	31·0	28·0	32·5	32·5
28	67 39	155 59	37·5	28	31·8	28·5	32·5	32
29	67 31	156 02	29·5	26·5	28·4	28·0	30	30 †
30	67 21	156 17	34	28·5	30·5	28·1	31	31 †
31	67 21	157 51	39	28·2	31·7	28·1	32·5	32·5 †
			40·5	24	30·46	28·3		

† Deposit of rain, or snow, or fog.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—JANUARY, 1842.

1842.

Day.	Barometer. Max.	Barometer. Min.	Barometer. Mean.	Winds. Direction.	Winds. Force.	Weather.
	Inches.	Inches.	Inches.			
1	29·461	29·158	29·315	E. by N.	1	2 b. cgp.s.*
2	·741	·466	·608	Easterly	1	0 c.
3	·768	·550	·797	W. S. W.	2	0 m.c.p.s.
4	·533	·358	·435	A.M. Westerly P.M. Southerly	3	A.M. 0 g.s. P.M. 5 b.c.
5	·461	·357	·432	S. Westerly	4	3 b.c.p.s.
6	·321	·039	·155	A.M. W. S. W. P.M. E. S. E.	2	A.M. 0 g.m.s. P.M. 0 g.
7	28·972	28·496	28·650	Westerly	A.M. 4 P.M. 6	0 q.m.s.
8	·762	·476	·587	A.M. Westerly P.M. S.S.E.	2 4	0 g.t. 0 g.m.
9	29·198	·764	·968	S. by E.	5	A.M. 5 b.c.q. P.M. 4 b.c.p.s.
10	·559	29·210	29·416	A.M. S.S.W. P.M. S. by E.	3 2	6 b.c.
11	·589	·556	·572	S. Easterly	1	4 b.c.
12	·576	·537	·558	A.M. S.S.E. P.M. E.N.E.	1	A.M. c. P.M. 0 g.
13	·545	·374	·456	Easterly	2	0 g.p.s.
14	·365	·262	·310	E.S.E.	3	0 g.p.s.
15	·489	·263	·343	S.S.E.	3	0 g.m.
16	·531	·465	·505	Southerly	A.M. 2 P.M. 1	0 g. 3 b.c.g.
17	·475	·170	·334	N.E.	3	1 b.c.g.q.
18	·163	28·949	·040	Northerly	5	0 g.q.p.s.
19	·221	·904	·088	A.M. N.W. P.M. N.N.E.	3 4	0 f.d.
20	28·885	·413	28·597	N.W.	10	0 q.s.
21	29·004	·776	·941	S.W. by W.	A.M. 5 P.M. 3	0 g.s. 2 b.c.g.
22	·396	29·018	29·208	Southerly	A.M .6 P.M. 3	0 g.
23	·490	·421	·465	A.M. Easterly P.M. N.E.	1 2	0 g.
24	·494	·450	·476	N.N.E.	4	0 g.
25	·500	·326	·444	N.N.W.	3	0 f.r.
26	·306	28·971	·101	N. Westerly	5	0 q.d.
27	28·987	·794	28·888	N. Westerly	3	0 g.p.s.
28	·846	·800	·821	A.M. W.N.W. P.M. Southerly	1	A.M. 0 g.s. P.M. 2 b.c.g.
29	·809	·711	·754	S.E. by S.	5	0 q.s.
30	·889	·710	·786	E.S.E.	3	0 s.
31	29·199	·923	29·044	S.E. by E.	1	0 s.
	29·768	28·413	29·196		3·1	

* For explanation of these symbols, see Appendix to Vol. I.

CHAPTER VII.

Breadth of the Pack. — Refraction. — Heavy Swell in the Pack. — The clear Sea in sight. — Gain the open Water: Proceed to the Southward. — Becalmed. — Large Iceberg seen last Year. — Severe Temperature. — Stopped by the great Icy Barrier. — Furthest South Latitude, 78° 10′. — Exploration of the Barrier. — Bear up for the Falkland Islands. — Strength of the Bay Ice. — Running to the Northward. — Aurora Australis. — Meteorological Abstract for February.

CHAPTER VII.

We found, as we drifted to the south-west, that the pack gradually opened, and we got amongst a much lighter kind of ice, the wind freshened to a gale from the northward, but did not seem to increase the swell. We furled the mainsail, and, with the topsails on the cap, bored our way before the wind through the lighter ice at an increased rate. The weather was foggy, with frequent snow showers, so that generally we could see only to a short distance before us; occasionally intervals of clear weather occurred, and afforded us a more extended view, during which we could select the most promising leads, and avoid the bergs: these were fortunately less numerous, much smaller, and not of the flat-topped barrier kind. Towards noon, we came to several holes of water from a quarter to half a mile in diameter, which confirmed our hope that the clear sea was not far distant to the southward; the favouring wind having died away to a very light breeze, we once more made all sail upon both ships. The rest of the day was passed with but little advantage; still, however, struggling forward with the assistance of warping and towing, as opportunities offered. 1842. Jan. 26.

The wind veered to the south-west, and freshened Jan. 27.

1842. considerably, enabling us to make better speed through the pack, which was also more open, and

Jan. 27. with a heavy westerly swell amongst it. At noon we had the equivocal satisfaction of finding ourselves a few miles to the southward of our predecessors on this meridian, Cook and Bellinghausen, being in latitude 67° 28′ S., longitude 156° 28′ W.

The wind again fell light in the afternoon, and we pressed all sail on our ships, towing along the piece of ice that was moored between them until 9·30 P.M., when, getting into a clearer space, we cast off, and bored our way to the south-eastward; but, after running a few miles, we were again stopped by the pack being too close for us to make any way through it; towards midnight, the swell had increased so much, that the vessels sustained many violent shocks, in pushing and warping through a belt of heavy ice that interposed between us and a large hole of open water that we were for several hours engaged in trying to reach, and which we had only

Jan. 28. just accomplished when it fell nearly calm; by the assistance of towing with the boats, we gained ten or eleven miles to the south-east before we were again stopped by ice too close to attempt to penetrate with so light an air of wind. The barometer was down to 28·8 all day, and heavy clouds hung loweringly along the horizon, whilst the threatening aspect of the sky, which kept us in a state of much anxiety, ill accorded with the glassy smoothness of the clear blue sea; the scud flying

swiftly from the north-west across the face of the sun, which occasionally appeared dimly in the intervals between the clouds, and the shattered crystals of the falling snow indicated its descent from a more disturbed region to one of almost perfect tranquillity. We had now given our rudders a fair trial, and found them to answer admirably, so that we considered our vessels as fit to fulfil the objects of the voyage as before the gale in which they had suffered so severely. 1842.

We were disappointed by our observations at noon placing us only in latitude 67° 39′ S., when, by our reckoning, we had nearly attained the sixty-eighth degree. Our longitude was 155° 59′ W., and the dip 80° 34′: we were therefore about four hundred and fifty miles from the place where we entered the pack; and, making allowance for a daily drift of about ten miles to the southward, which we found to be about the average since the 18th of December, the breadth of the belt of ice we had thus far passed through could not be less than eight hundred miles, and still we were not much more than half a degree beyond Cook, who never had occasion to enter the pack at all: so great is the difference that circumstances of season make in the navigation of icy seas. We turned our present detention to good account by trying the temperature of the sea at various depths, and employing our shipwrights in replacing some of the sheets of copper that had been torn off during the

1842. gale of the 20th, and which the smoothness of the water greatly facilitated.

In the evening, a breeze sprung up from the southward, clearing away the dark-looking clouds, and giving us once more a view of the clear sky: the sun, when near the horizon, presented that remarkable flattened appearance which I have before described. The horizontal diameter, on being measured, was 32′ 35″, or in very near accordance with that given in the Nautical Almanac, whilst its vertical diameter was only 27′ 35″, showing a difference of refraction between its upper and lower limb amounting to five minutes.

Jan. 29. The wind freshened from the southward, but the ice was too close for us to make any way through it; we therefore kept dodging under easy sail, in a hole of water, until it became too small for us any longer to sail about, and we were compelled to have recourse to the largest piece of ice we could get hold of, which, having secured between the ships, we furled all the sails, and were carried away with the pack back to the northward, without being able to make an effort to maintain our ground. During the afternoon we had thick weather, with snow; the wind had increased to a gale, with violent squalls from the southward, but there was no swell amongst the ice, and we experienced neither anxiety nor inconvenience, beyond the natural vexation at finding we were losing all the southing we had gained by much exertion and hard labour.

The strength of the gale gave way about 1 A.M., when the barometer, at 28·7 inches, began to rise, the wind at the same time veering to the eastward, brought with it clearer weather, and we had the satisfaction to find the pack much more open, with larger holes of water than we had before seen; the westerly swell had also risen to a considerable height, and our ships received many severe blows by falling against the heavy pieces of ice to which they were attached, or striking against others equally heavy. We were fortunate during the fog and snow, in having drifted clear of the numerous bergs which we now saw in all directions around us. As the swell from the westward continued to increase, the shocks became more frequent and violent, so that immediately after the performance of our usual Sunday service, under these anxious circumstances, we cast off, and made sail, with the view to push the ships to the westward to meet the swell, under the impression that clear water could not be far distant in that direction. During the remainder of the day, and the whole of the night, we made tolerable progress, boring through the patches that separated the pack, and, with unceasing labour and fatigue, using every means of warping and heaving through those which were too close to penetrate without these additional aids. But the wind failed us early in the forenoon of the following day, and left us quite unmanageable, owing to the westerly swell which was running so high, that, although abso-

1842. Jan. 30.

Jan. 31.

1842. lutely necessary for our safety, it was both difficult and dangerous to employ the boats in towing the ships clear of the heavier pieces, and against which, notwithstanding all our endeavours to avoid it, the Erebus was driven with violence, but providentially escaped with little damage beyond springing the bowsprit, and having all its rigging broken or torn away; this was very soon replaced, and our wounded spar secured.

This harassing and anxious work continued during the remainder of the day, the perfect calm and heavy swell rendering us nearly helpless, whilst the sea was beating with so much force against the large blue sea-worn masses as to render our situation exceedingly critical, and the labour to the officers and crews, in trying to keep the ships clear of them, constant and excessive; nevertheless, we recognised in the peculiar character of the ice we were now amongst, that which is almost invariably found at the outer edge of a pack; and this sure prospect of a speedy release afforded us encouragement, in the assurance that all these labours were not to be in vain, and, at the same time, seemed in no small degree to stimulate to renewed exertions.

Feb. 1. Early in the forenoon of the next day the southerly wind, which had blown feebly for some time, freshened sufficiently to give us again command of the ships, and we commenced beating to the south-west, in which direction a cloud of dark mist convinced us we should find an open sea. At noon, our observations informed us we had been

driven back with the pack far to the northward, 1842.
notwithstanding all our efforts, being in latitude 67° 18′ S., and longitude 158° 12′ W. Toward evening, the wind favoured our intentions, by veering round to the north-west, and afterwards to the northward. The clear sea came in sight before dark; and as we approached the margin of the pack, the long westerly swell made the ships roll deeply; at this time the pack edge, consisting of heavy washed pieces, was visible through the deepening shades of night, a fearful line of foaming breakers. Either a storm or a calm would have proved equally dangerous in our present position, and, notwithstanding the disadvantage of such a measure during the period of darkness, it became necessary, at all risks, to push through to the clear water; lest any change of circumstances should arise that might render it impracticable if delayed until daylight. All hands were at their stations, as, impelled by a strong breeze, we advanced on our course, and, aided by the light which the line of broken water afforded, the eye strove in vain to find a spot less difficult by which to gain the clear sea beyond it; but not the smallest break could be detected along this formidable-looking barrier, whilst the necessity of breaking a way through it with our ships became every moment more urgent, as the wind still freshened, threatening us with a gale, and obliging us to reduce our sail to double reefed topsails and courses. Soon after
midnight, the Erebus entered the broad band of Feb. 2

1842. heavy ice and foam, and succeeded by 2 A.M. in gaining the clear sea, closely followed by the Terror; and although part of our stem was broken off, and the ship much strained by the heavy shocks she encountered, we were thankful to find she had escaped with such comparatively trifling injury. At this time we were in latitude 67° 29′ S., and longitude 159° 01′ W.; and the joy we all felt at our escape from the pack, in which we had been involved fifty-six days, cannot possibly be imagined, heightened, as it was, in some degree by the fact of the wind shifting to the westward, with thick weather almost immediately after we had got clear of the ice, which would have prevented our release at any rate for some days, had we not fortunately accomplished it before the change took place. Still, however, we were not entirely free from anxiety; the wind blowing a strong breeze, directly on to the pack, obliged us to keep a heavy press of sail on the ships to prevent their being again driven down upon it. The thick-falling snow limiting our view to a distance of half a mile, we were uncertain of the result for some hours; but, on the weather clearing up, we had the satisfaction of finding ourselves in an almost perfectly clear sea, a few heavy straggling pieces, and two or three small bergs being the only ice in sight.

At noon we were in latitude 67° 57′ S., longitude 160° 03′ W., and the wind having moderated and shifted to the south-west, we stood to the south-eastward, until making the pack edge at 6 P.M.,

when we tacked to the westward, the swell still running high from that quarter. The night was clear, and, for the first time, several stars were visible, warning us that the season for navigating these seas was fast drawing to its close. 1842.

At 4 A.M. a change of wind enabled us to steer to the southward and eastward; but by noon, when in latitude 68° 23′ S., and longitude 159° 52′ W., a chain of long, low, barrier-like bergs, ranging along the margin of the pack, came in sight, extending as far to the southward as the eye could discern from the mast-head. As it appeared to trend in a north and south direction at least to the distance of twelve or thirteen miles, we tacked and stood off until midnight, and then again turned the ships' heads to the southward. Feb. 3.

The morning was dull, with light falling snow, and a moderate breeze from the westward. At 6 A.M. the pack was seen, and we bore away along its edge to the southward for three or four hours, when we perceived it stretching across our path, thus suddenly assuming a westerly trending, and forming a deep bight, in which we found ourselves embayed; we therefore set to work immediately to beat out of it as fast as the light north-west wind permitted; for to have been caught in such a situation by a gale, would have been both extremely embarrassing and perilous. At noon we were in 68° 50′ S., and longitude 160° 20′ W., the dip had increased to 81° 37′, and the variation to 29° 41′ E. Commander Crozier came on board in the after- Feb. 4.

1842. noon, and informed me that on Sunday last, whilst our ships were in a very critical position in the pack, the Terror was on fire for two hours: some blocks of wood, which had been left too near to the warm air stove, ignited, and the smoke issuing from the main hold, gave immediate notice of the fact; the fire was happily got under by the promptitude and exertions of the officers and crew, without their having occasion to increase our embarrassments by soliciting our aid. By means of a powerful engine, which was always kept in readiness, the hold was filled with water to a depth of two feet, and soon extinguished the fire, which was close down upon the kelson. All other accounts from her were satisfactory; and I was especially glad to find she had suffered even less than we had in clearing the pack.

The remainder of this, and nearly the whole of the following day, were spent in beating along the pack edge to the westward, sometimes passing through heavy streams of ice, but without

Feb. 5. being able to make any southing until 8·30 P.M., by which time the wind had freshened to a gale from the north, with fog and snow; and finding that the pack resumed its southerly trending, we bore away, under moderate sail, before the gale; for however hazardous this measure may seem to be, and really was, yet we had so few days of the navigable season left, it became necessary to incur some additional risk, if we hoped to accomplish any thing worth doing.

We passed close by several small bergs, and 1842.
doubtless many others, at no great distance, were concealed from us by the dark night and dense fog that prevailed; but we met with no more streams or loose ice, and soon after midnight the wind abated, leaving a heavy swell from the northward, before which and the moderate breeze we continued to steer to the S.W., unable to see more than a quarter of a mile before us, and of course uncertain what events the next hour might produce, until at length the wind became so light that our ships no longer had steerage way, and we lost all command over them: they drifted before the long northerly swell, rolling heavily and deeply. We remained in this helpless and anxious state until midnight, when a light southerly wind arose, dispelling the fog, and showing us how mercifully we had been prevented from running into a heavy pack, and amongst great numbers of bergs, which we assuredly should have done had the northerly wind lasted another hour, for they were at this time not more than four miles from us to the southward.

Feb. 6.

Feb. 7.

The breeze increased quickly to a gale by 6 A.M., but, being now under the lee of the pack, the swell which had occasioned us so much discomfort and uneasiness soon subsided, and we carried all sail to maintain our ground, running close along the pack edge, which trended to the westward, in smooth water, and although the sky was overcast, and the weather gloomy and squally, it was sufficiently

1842. clear to admit of our seeing to the distance of several miles, so that we proceeded without hazard, and with more than usual comfort, until 8 A.M. the
Feb. 8. following day, when the wind, which had fallen to a light breeze, suddenly shifted to the westward, and afterwards to the N. W., bringing with it the common accompaniments of fog and snow. As no opportunity was to be lost of making even a few miles of southing, all sail was made on the ships, and, for the first time since our release from the pack, we had every studding-sail set. Our satisfaction was, however, of short duration, for during a partial clearing of the weather at 4 P. M. we observed the pack ahead of us, and the wind backing to the westward at the same time obliged us to stand to the northward on the port tack, to increase our distance from the lee ice, and to get clear of the heavy loose fragments by which we were surrounded.

During the day we passed a berg whose diameter measured nearly four miles; doubtless the same we saw on the 13th of February last year, in latitude 76° 11′ and 172° 7′ W.*, with which all its dimensions accorded. Its position to-day was 70° 30′ S. and 173° 10′ W., from which we may assume that its rate of drift to the southward averaged about one mile per diem.

Feb. 9. With a strong breeze from the north-west in the morning, and westward in the evening, we beat

* See Vol. I. p. 240.

along the pack edge, making, however, but small progress, on account of the heavy swell, until the afternoon, when the weather became fine and the wind more moderate. 1842.

At noon we were in latitude 70° 39′ S., longitude 174° 31′ W., the magnetic dip 83° 48′ S., and the variation 38° 32′ E. We availed ourselves of the favourable weather to try the temperature of the sea at the following depths:—at 600 fathoms it was 37°·6; at 450 fathoms, 35°·8; at 300 fathoms, 35°; at 150 fathoms, 32°·1; and at the surface, 28°; the specific gravity being 1·0273 at 30°. At 6 P.M. we fetched to windward of the west point of the pack, which appeared composed of very heavy hummocky ice, and which afterwards seemed to trend to the south-west, forming a deep bight; we stood across this until we reached its next westernmost point, which, not being able to weather at midnight, we tacked, to keep in smooth water under its lee.

By daylight we were again close with the pack, Feb. 10. and passed another heavy western point of it at 8 A.M.

The day was remarkably fine, but the westerly swell prevented us greatly, and our progress on this and the following day, during which fog and snow prevailed, was very trifling, and our labour and anxiety considerable.

On the morning of the 12th, the weather be- Feb. 12. coming clear, we again stood to the southward, and at noon we were in latitude 71° 2′ S.,

1842. longitude 179° 13′ W., the magnetic dip, 84° 27′, when the wind veered to the northward, bringing with it frequent snow showers, but with considerable intervals of clear weather; we again crowded all studding-sails on the ships as we pursued our course right before the wind, the edge of the main pack being sometimes seen to the westward, but becoming so distant before dark, that we could see nothing more than the line of blink hanging over it; and being assured that we had turned its western extreme, we continued

Feb. 13. under all sail throughout the night, and by noon the next day we were in latitude 72° 27′ S., longitude 178° 40′ W. In the afternoon thick fog prevailed and the wind fell gradually lighter, until at midnight it was quite calm.

Feb. 14. Early in the morning a breeze sprang up from the north-eastward, which freshened to a strong gale before noon, and was accompanied by fog, and snow which fell without intermission throughout the whole day. We nevertheless made some progress to the south-east, under close-reefed topsails and storm staysails, meeting only a few fragments of berg ice. The storm blew with unabated force

Feb. 15. all the next day, and the swell had so greatly increased, as to convince us that the pack must be very distant to the westward; a few small bergs and some heavy fragments were met with as we maintained our southerly course under all the sail our ships could carry, our chief anxiety being to prevent them parting company, which the inces-

sant snow and fog rendered very difficult. The 1842.
wind having backed to the southward, drove us farther to the westward than we wished, so that at noon we were in latitude 74° 26′ S., and longitude 182° 0′ W., the magnetic dip 86° 43′ S. Towards evening the gale moderated, and admitted of our making more sail on the ships. By 5 A.M. Feb. 16.
we had little more than a fresh breeze, and at noon it was nearly calm, with clear weather. Our latitude was 75° 6′ S. and longitude 187° 04′ W., magnetic dip 87° 11′, and the variation 77° 17′ E. The prospect on the fog clearing away was most cheering; not a particle of ice, except two small bergs, being in sight from the masthead; and although we could not fail to remember that three days anterior to this date last year we were compelled to relinquish our exploration along the barrier to the eastward, in consequence of the sea freezing over, yet we had every reason to believe, from the temperature we had hitherto experienced, that the last winter had set in both earlier and with greater severity than usual: we, therefore, still hoped to accomplish something more. Our crews were employed clearing away the ice which had accumulated about the hull and rigging by the freezing of the waves and spray that fell over them during the late gale. In the afternoon we hove to and sounded in two hundred and ninety fathoms, on a bottom of green mud, the temperature at that depth being 32°, while that of the surface was 30°.

1842. The current was found to be setting S. 78° W., at the rate of nine miles daily. The dredge was put overboard for a short time, and many curious invertebrate animals and a small fish were taken in it. The Cape pigeon and white petrel were seen in great numbers; the latter flew to the westward in the evening, towards Franklin Island, where we observed last year they had made their nests on the tops of its perpendicular cliffs. A few whales and some finners were also seen during the day. The light breeze which prevailed from the southeastward until midnight veered round to N.N.E.,

Feb. 17. and increased to a fresh breeze at 6 A.M., so we steered to the southward under all sail. At noon we were in latitude 75° 53′ S., longitude 184° 52′ W., and magnetic dip 87° 03′ S. Several pieces of ice were seen in the afternoon, but neither bergs nor pack were met with, and we pursued our course, elated with the prospect of still being able to attain a high latitude before the setting in of the winter.

Feb. 18. At noon we were in latitude 76° 52′ S., longitude 178° 0′ W., and the wind shifting to the southward we stood to the eastward on the starboard tack; late in the evening, on the snow clearing away, the ice blink was seen at a great

Feb. 19. distance ahead of us; and the number of white petrel which we met with the next morning, warned us of our approach to the pack. Our observations at noon indicated that we had been carried to the northward by a current nearly fifteen miles during

the last twenty-four hours, our latitude being 76° 41′ S. and longitude 173° 48′ W., the magnetic dip 86° 38′ S., and the variation 82° 35′ E. At 2 P.M. we sounded in two hundred and fifty fathoms, when a quantity of green-coloured mud was brought up in the deep sea clamms; although we had run seventy miles directly towards the ice-blink that was observed the preceding evening, no pack was to be seen before dark, but the temperature of the air falling to 16° at midnight, we proceeded under moderate sail during the night. 1842.

The wind blew a gale early next morning, and a heavy sea got up. Coming directly from the great southern barrier, it was piercingly cold, the thermometer at noon standing at 19°. Still, however, no ice was to be seen, except only a few fragments of bergs, although we were thirty miles to the eastward of the spot from which we were compelled to retreat last year; it being then covered with a dense pack, and the temperature of the air being at 12°, the young ice formed so rapidly that we had considerable difficulty in extricating the ships from it, another proof of the mildness of this season as compared with that of last year. Feb. 20.

The southerly gale continued to blow with violence during the whole of the next day, and with the thermometer at 19° the waves, which broke over the ships, froze as they fell on the decks and rigging; by this means a heavy weight of ice accumulated about the hull and ropes Feb. 21.

1842. Feb. 21. which kept the crew constantly employed with axes, breaking it away; and from their exposure to the inclemency of the weather, several of them suffered severely. A remarkable circumstance occurred on board the Terror during this storm, which may help to convey a better idea of the intensity of the cold we experienced than the mere reference to the state of the thermometer. Whilst her people were engaged chopping away the thick coat of ice from her bows, which had been formed by the freezing of a portion of each wave that she plunged into, a small fish was found in the mass; it must have been dashed against the ship, and instantly frozen fast. It was carefully removed for the purpose of preservation, a sketch of it made, and its dimensions taken by Dr. Robertson, but it was unfortunately seized upon and devoured by a cat. Dr. Richardson observes*, "that the sketch is not sufficiently detailed to show either the number or nature of the gill and fin rays, or whether the skin was scaly or not, so that even the order to which the fish belongs is uncertain, and we have introduced a copy of the design, merely to preserve a memorial of what appears to be a novel form, discovered under such peculiar circumstances." It was rather more than six inches in length.

In the evening the gale abated and veered to the northward, which enabled us to make more

* Zoology of the Voyage. Fishes, Part II. p. 15. plate 8. fig. 3.

sail and resume our southerly course; early the next morning we began to meet with numerous pieces of heavy ice, and afterwards streams more or less compact, through which we were obliged to force the ships. Several bergs of the table-top form and of large size were also seen. 1842. Feb. 22.

At noon we were in latitude 76° 42′ S. and longitude 165° 50′ W., the magnetic dip 85° 40′, and the variation 82° 46′ E. A piece of ice was seen bearing a black rock, apparently about six feet in diameter; and at 6 A.M. we hove to, and obtained soundings in one hundred and ninety fathoms, green mud and small black stones; hence we inferred, that the numerous lofty bergs by which we were surrounded had grounded on this bank after their detachment from the place of their formation. The great barrier was seen from the masthead just before midnight, the weather being fine and the breeze moderate from the northward; but as it was blowing directly on to the barrier, we were obliged to approach it with caution, for a more Feb. 23.
dangerous lee shore could not be imagined. As soon, therefore, as we got within five or six miles of its vertical cliffs, we hauled to the eastward, in order to continue its examination, and with the hope of being able to turn its eastern extremity and then attain a much higher latitude. But the young ice which we had observed thickening rapidly under the severe temperature became so strong that we could hardly make any way through it, and were ultimately compelled to haul off to the

1842. north-westward, and wait for more favourable weather.

Feb. 23. At noon we were in latitude 77° 49′ S. and longitude 162° 36′ W., the wind veering to the eastward, we tacked at 1h 30m P. M. and stood towards the barrier, for with a leading wind we might approach it safely, as near as the loose ice which projected some distance from it would permit. Some bergs and heavy pieces of ice, with numerous stones and patches of soil on them, raised our expectations of soon seeing the land; but at 7 P. M., when we were within a mile and a half of the face of the barrier, our further progress was stopped by the belt of broken fragments at its foot, which were firmly cemented together by newly formed ice. As the Terror was some miles to the northward, we hove to until she came up to us, and whilst waiting for her we obtained soundings in two hundred and ninety fathoms, the deep sea clamms bringing up some green mud, intermixed with small volcanic stones. This depth of water would seem to prove that the outer edge of the barrier was not resting upon the ground; for by various measurements of its highest part, it was found to be only one hundred and seven feet above the sea, from which point it gradually diminished for about ten miles to the eastward, where it could not have been more than eighty feet; but beyond that distance it again rose higher.

The point at which we had approached it was on the east side of a bay between eight and nine miles

deep, so filled with ice that we were unable to get further into it; its outline was much more broken and indented than we had found it last year further to the westward, and its perpendicular cliffs had dwindled down to less than half their elevation at their attachment to Cape Crozier, at the foot of Mount Terror. 1842.

The temperature of the sea near the bottom was 30° 8′, or about two degrees colder than due to the depth at a distance from the barrier; thus showing how trifling was the effect of this enormous mass, whose influence we might have expected to have been sufficient to have reduced the temperature of the sea to its freezing point, even at the distance of a mile and a half.

The Terror came up to us in about half an hour, when an interchange of signals took place. The latitude of the Erebus computed from our observations at noon was 78° 8′ S., that of the Terror, 78° 11′ S.; the mean of which, 78° 9′ 30″ S., was adopted as our latitude, which would place the face of the barrier in 78° 11′ S., in the longitude of 161° 27′ West. From this point it trended considerably to the northward of east, forbidding the hope of our reaching a higher latitude this season; and although we had only surpassed that of last year by about six miles, we could not help feeling that but for the success which had attended our exertions on that occasion, the result of our operations this year would have been more highly appreciated, and that in being permitted a second time to ex-

1842. tend our researches so much beyond our predecessors, we had been singularly favoured.

Feb. 23. Having thrown overboard a cask containing a brief sketch of our proceedings, which may at a future day be met with and help to throw some light on the winds and currents which prevail in these regions, we made sail along the barrier to the eastward; as we came to the lower part of it, which I have already noticed, we perceived from our mast-heads that it gradually rose to the southward, presenting the appearance of mountains of great height perfectly covered with snow, but with a varied and undulating outline, which the barrier itself could not have assumed; still there is so much uncertainty attending the appearance of land, when seen at any considerable distance, that although I, in common with nearly all my companions, feel assured that the presence of land there amounts almost to a certainty, yet I am unwilling to hazard the possibility of being mistaken on a point of so much interest, or the chance of some future navigator under more favourable circumstances proving that ours were only visionary mountains. The appearance of hummocky ridges and different shades, such as would be produced by an irregular white surface, and its mountainous elevation, were our chief grounds for believing it to be land, for not the smallest patch of cliff or rock could be seen protruding on any part of the space of about thirty

degrees which it occupied. I have therefore marked it on the chart only as an "appearance of land." 1842.

As we advanced to the north-eastward we found the young ice so much strengthened by the thermometer falling to 18° at midnight, that we had difficulty in forcing the ships through it; and at seven the next morning the main pack pressing closely against the barrier, prevented our proceeding in that direction. We were therefore compelled to relinquish its further exploration, not only by the obstacle which had now presented itself, but on account of the surface of the sea, owing to the severity of the temperature, having become one unbroken sheet of ice as far as the eye could discern from the mast-head, threatening to freeze the ships up for the winter in a position of a most dangerous character, and from which it was not possible they could be extricated, except by the assistance of a strong breeze, which was now fortunately blowing from the S. E., and afforded us the means of boring the ships through the young ice to the N.W., under all sail; after running about thirty miles right before the breeze, we got clear of the bay ice in which we had been involved, and were once more in clear water. Feb. 24.

The setting in of the winter now required us to bring our operations in the higher southern latitudes to a close, and seek a more temperate climate in which to pass the winter. And although our hopes of extended discoveries during the

1842. Feb. 24. season had been frustrated by our protracted and tedious detention in the pack, and the difficulties of penetrating a mass of more than a thousand miles in thickness had been overcome by the perseverance and exertions of my companions, still the time that was consumed in that laborious and fatiguing work left us only a few days of the worst part of the season to pursue our purpose. We had, however, during that brief space attained a somewhat higher latitude than last year: we had traced the continuation of the barrier ten degrees of longitude further to the eastward, and had extended our researches over a large portion of the hitherto unexplored parts of those regions; an amount of success, which, whilst struggling in the pack, few of us could have anticipated, had resulted from our endeavours to justify the trust which had been placed in our hands, and to call forth our heartfelt gratitude to Him by whose providence we had been so mercifully preserved and guided through the many dangers which we had encountered.

As soon as we got clear of the bay ice, I made known my intentions by signal to Commander Crozier to run to the northward along the pack edge to seek for any opening which might lead us by a shorter course by the *ne plus ultra* of Cook, to the Falkland Islands, where I proposed to winter, and refit the ships before making a third effort to gain a high southern latitude,

on the meridian of 35° west longitude, where our countryman James Weddell had with but little difficulty pushed beyond the seventy-fourth degree. Towards noon the breeze freshened to a gale, and we scudded before it, under treble reefed top-sails and fore-sail, at a rapid rate, passing many fragments of broken up bergs, half concealed by bay ice, and the constantly falling snow which prevented our seeing to any considerable distance; we were, however, compelled to run whilst the gale lasted, lest if the wind should fall light, we should be unable to force our way through the streams of young ice. The strong easterly wind continued throughout the night and the whole of the following day, and the weather being clear and the water smooth, we made good way along the pack edge to the north-west, passing through some streams of heavy ice, and thick sludge and pancake ice, much discoloured by the infusorial creatures which were frozen in them. At noon we were in latitude 74° 50′ S., and longitude 166° 15′ W., and being several miles a-head of the Terror, we rounded to, at 1 P.M., to try for, but did not obtain, soundings with four hundred and fifty fathoms of line. The temperature at that and several intermediate depths was also determined.

1842.

Feb. 25.

The pack seemed here to take a more northerly trending, but by keeping close along its margin we found we had run into a deep bight, at 4^h 30^m

1842. P.M., when we were obliged promptly to shorten sail, and to haul out to the westward, nor did we clear the northern part of it until after midnight. The barometer, which had been falling all the morning and afternoon, stood at 28°·380 at 6 P.M., but had risen to 28°·415 by midnight, the wind at the same time shifting to the southward.

Feb. 26. The general trending of the main pack carried us much farther to the westward than we wished; but it was so close and heavy that we could not venture to enter it. As we continued the examination, we frequently got entangled amongst the newly formed ice and streams which occurred at some distance from its margin; favoured, however, with a fine breeze from the south-westward, we pursued our way to the northward, and at noon were in latitude 72° 46′ S., and longitude 170° 01′ W. In the evening we found that in our anxiety to keep as near the pack edge as possible, we had run far into another of its deep indentations, we therefore hauled to the wind on the port tack, in order to weather its lee point; this we were very uncertain about during the whole night, the ship being surrounded with thick young ice, rapidly increasing in strength, with the temperature at 22°: at times we were hardly able to make any way through it, notwithstanding the fresh breeze that was blowing, and owing to the darkness of the night we could not know whether the ships might not be falling down upon the pack

under our lee; all our apprehensions, however, of being driven again into the ice were dispelled at daylight, when we saw the clear water at only two or three miles distance from us, and by 9 A. M., having weathered the westernmost point of the pack, we bore away before the wind to the north-westward along its margin. 1842. Feb. 27.

It was a beautiful afternoon, the sun breaking through the clouds gave a life and cheerfulness to the scene around us, of which we had been many days deprived; and, with a steady moderate breeze from the south-eastward, we continued our course under all sail, the pack to our great satisfaction trending so much more to the northward, gave us good reason to hope that from it we should meet with no further obstruction.

In the evening Commander Crozier expressed by signal his wish to communicate, which I was equally glad to have the opportunity the fine weather afforded of doing; and I had the pleasure of receiving the congratulations of himself and his officers on the successful issue of our labours, notwithstanding the unfavourable circumstances under which they were commenced. I was also much gratified to learn that the officers and crew of the Terror maintained the same good health and spirits as did our own, the few cases of severe cold and bruises that some had suffered having been completely overcome by the judicious treatment of

1842. the medical officers, and at this time there was not a single individual complaining in either ship.

Feb. 28. Keeping at a distance of between three and four miles from the pack edge, we continued our course to the northward, and at noon were in latitude 70° 54′ S., and longitude 175° 36′ W. During the last few days the white and blue petrel were seen in great numbers. Cape pigeons, sooty albatross, and gigantic petrel less numerously; some penguins also were occasionally seen, and their cry more frequently heard. Seals were comparatively few, but the small fin-backed whale, as also the piebald kind, were numerous along the pack edge.

At 4 P.M., we observed an extensive chain of bergs so close together that we could see no way through them, and were therefore obliged to haul to the south-westward; nor was it until near midnight, when we had run along the chain between thirty and forty miles, that we cleared its western extreme and were enabled to resume our course. Three of them were much marked with patches of rock and soil, and some of them of the flat-topped barrier form must have been in violent collision with each other, judging from the immense fragments upon their summits. The night was beautifully clear, the stars bright, and the moon afforded us considerable light. The Aurora Australis was seen forming into concentric

arches through and about ten degrees on each 1842.
side of the zenith, resting on the east and west points of the horizon; it had occasionally some slightly flitting motion, but did not exhibit any colours.

1841. ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—FEBRUARY, 1842.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temp. at 9 A.M.	
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in shade.	Dew point.
1	67° 18′	158° 12′	33°	28°	29·6°	28°	30°	28°
2	67 57	160 3	33	27·5	28·9	28·3	31·5	28
3	68 23	159 52	30	26·5	28·1	28	31·5	24
4	68 50	160 20	35	28	30·5	28·5	31·5	27·5
5	68 59	163 53	31	29·5	30	28·3	32·5	29
6	65 51	167 39	31·8	29	30	28·2	32	32*
7	70 18	169 49	29	24·5	27·4	28·2	30	27
8	70 19	174 00	29	24	26·7	28·1	29·5	21
9	70 39	174 31	33	26	27·9	28·4	30	21
10	70 3	176 23	30	26	28·4	29·8	30	25
11	70 06	178 18	32·5	29	30·5	30·6	31·5	31·5*
12	71 02	179 13	34	28	29·4	29·9	31	28
13	72 27	178 40	30·5	27	29·3	30·4	31	30·5
14	73 23	177 56	29	26	27·9	31	30	30*
15	74 26	182 00	26·5	24·5	25·1	30·2	28	28*
16	75 06	187 04	26·5	24	25·1	30·2	26	19
17	75 53	184 52	29·5	25·5	27·7	30·3	28	27
18	76 52	178 00	26·5	23·5	25·1	29	26	24·5
19	76 14	173 48	24·5	17	21·9	28·8	25	21·5
20	76 14	167 25	19·5	16·5	18·5	28·4	20	20
21	75 53	165 08	23·5	19	20·9	28·5	20	20
22	76 42	165 50	28	24	26	28·8	29	29
23	77 49	162 35	30	19·5	25	28·5	26	18
24	76 51	161 30	27·7	21	25	28 4	27	21
25	74 50	166 15	29·5	27·5	28·1	28·8	28	27
26	72 46	170 01	26·8	23	24·9	28·5	26	21
27	72 1	172 25	25·5	22·5	23·8	28·5	25	13
28	70 54	175 36	27	24	24·9	28·3	25	21·5
			35	16·5	26·68	28·96		

Deposit of rain, or snow, or fog.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—FEBRUARY, 1842.

1841.

Day.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·368	29·206	29·303	A.M. Southerly P.M. Westerly	2 3	0 g.s. 1 b.c.g. *
2	·200	·048	·115	A.M. Westerly P.M. S.Westly.	4	A.M. 0 m.s. P.M. 3 b.c.g.
3	·264	·067	·129	S.W.	4	A.M. 0 g.q.s. P.M. 4 b.c.q.
4	·561	·291	·417	Westerly	3	A.M. 3 b.c.g. P.M. 0 g.s.
5	·565	28·877	·324	Northerly	5	0 g. s.
6.	28·839	·581	28·667	A.M. N.N.E. P.M. S.Eastly.	3 1	0 f.p.d.
7	·856	·565	·654	S.E.	5	0 g.q.
8	·962	·683	·843	Westerly	4	0 g.s.
9	·959	·682	·806	S.W.	4	A.M. 0 q.p.s. P.M. 4 b.c.p.s.
10	29·276	·978	29·156	S.Westerly	3	5 b.c.g.
11	·189	·635	28·807	A.M. Northerly P.M. Westerly	4 6	0 m.p.r.s.
12	·067	·781	·960	A.M. S.S.W. P.M. N.N.W.	4 2	2 b.c.g. 0 s.
13	28·948	·674	·801	A.M. W. by N. P.M. S.W. by W	3	0 f.p.s.
14	·691	·585	·627	E.N.E.	6	0 q.s.
15	29·106	·706	·891	East	8	0 q.s.
16	·180	·970	29·088	Easterly.	2	0 g. d. q.
17	·028	·862	28·930	N. Westerly	4	0 q.p.s.
18	·053	·846	·975	A.M. S.E. P.M. N.Eastly.	3	A.M. 0 p.s. P.M. 2 b.c.g.
19	28·835	·518	·646	Easterly	5	0 g.
20	·496	·283	·354	E.S.E.	7	3 b.c.q.
21	·842	·277	·566	S.S.E.	8	0 q.s.
22	29·081	·860	·991	A.M. S.W. P.M. W. by N.	4 3	3 b.c.q. 1 b.c.g.
23	·151	·987	29·088	A.M. Westerly P.M. Northerly	3	5 b.c.
24	28·973	·476	28·677	N.E.	4	0 q.p.s.
25	·481	·380	4·32	N.E.	4	0 g.p.s.
26	·642	·425	·544	S. Easterly	5	0 q.s.
27	·571	·488	·520	E.S.E.	2	0 g.p.s.
28	·543	·474	·510	N.Easterly	A.M. 3 P.M. 4	2 b.c.g.
	29·565	28·277	28·8507		4·12	

* For explanation of these symbols, see Appendix to Vol. I.

Sketched by Dr. Hooker.

Tussac Grass of Falkland Islands. Page 270.

CHAPTER VIII.

Magnificent Range of Bergs. — Colour of the Sea. — North-easterly Gale. — Recross the Antarctic Circle. — Collision with the Terror. — Loss of Bowsprit — the Stern-board. — The Escape. — Unusual Phenomenon. — Repair Damages. Focus of Greater Intensity. — Circle of Mean Temperature of the Ocean. — Meteorological Abstract for March. — Current off Cape Horn. — Beauchène Island. — Anchor in Port Louis, East Falkland Island.

CHAPTER VIII.

1842.

March 1.

THE magnificent range of stupendous bergs which had occasioned us so much uneasiness during the night, was again seen this morning, extending in an unbroken chain to the northward as far as the eye could discern from the mast-head, and joining on with that large cluster through which we had been so mercifully guided during the storm and thick fog of the 11th of February, when on our way to the southward. The pack edge was observed stretching several miles to the westward of the bergs, and terminating in a point which we rounded at 1 P.M. It consisted of an accumulation of the heaviest masses of ice I ever remember to have seen, of a deep blue colour, and much worn and rounded by the action of the sea. Several hundred seals were plunging and splashing about off the point, and two or three that were on the ice, appeared with much difficulty to maintain their hold as the waves broke over them. From this point the ice trended away to the eastward, but the long line of bergs obliged us to pursue a north easterly course. At noon our latitude was 69° 52′ S., longitude 180°; the magnetic dip 83° 36′ S., and the variation had decreased to 33° 7′ E.

It was a fine night; and having passed the chain of bergs, we were enabled to resume a more

1842. easterly course. Some faint coruscations of the Aurora Australis were seen near the zenith at 1 A. M. for only a few minutes.

March 2. It blew a moderate breeze from the south eastward, and the day was fine; the sun occasionally appeared, but was more generally obscured by clouds and thick snow showers. The sea was remarked to have assumed its oceanic light blue colour, from which we inferred that the ferruginous animalculæ, which give a dirty brownish tint to the waters of the southern ocean, prefer the temperature which obtains in the vicinity of the pack; for here, as in the arctic regions, our approach to any great body of ice was invariably indicated by the change of colour of the sea. Large flocks of the blue petrel and Cape pigeons were seen, and the cry of the penguin was frequently heard.

March 3. It was calm during the night, and until 7 A. M., when a breeze sprang up from the northward, and the forenoon being fine, we all greatly enjoyed the rise of temperature of the air from 23° to 36° which had occurred in less than two days, whilst that of the surface of the sea had risen to 33°.

At noon our latitude was 67° 28′ S., longitude 174° 27′ W.; the magnetic dip 82°·18′, and the variation 26° E.: in the afternoon we tried for, but did not obtain, soundings with 600 fathoms; the temperature at that depth was 38°; at 450 fathoms, 37°·5; at 300 fathoms, 35°·5; and at 150 fathoms, 34°·2: the specific gravity of the surface water

1·0276 at 33°. A current was found setting S. 30° E., at the rate of six miles per diem. 1842.

Dense clouds rising in the north, sending forth frequent squalls and snow showers, warned us of the approach of an inclement night for which we made all the necessary preparations. We had seen only two icebergs during the day; and considering that we were far enough to the northward of the thick of them, we did not hesitate to run during the night, although the constantly falling snow prevented our seeing beyond a very short distance, and the night was also extremely dark.

The expected gale came on soon after mid- March 4. night, and gradually increased in strength until noon, when it blew with great violence. The barometer at that time was 28·162 inches, but began to rise soon afterwards, when the wind suddenly shifted from N. E. to N. W., and abated, the sea as rapidly going down, and the weather turning out beautifully fine in time to relieve us from the anxieties attendant on the eight hours of darkness to which the nights had now lengthened. Throughout the remainder of this and the early part of the following day we experienced March 5. variable but moderate winds, and at noon were in latitude 67° 8′ S., longitude 171° 38′ W., the continued depression of the barometer, notwithstanding the moderate weather, surprised us so much that I suspected it had met with an accident. I therefore made the signal to the Terror to com-

1842. pare barometers, and was gratified to find my apprehensions were groundless, the two instruments indicating very nearly the same amount of pressure; the Terror's being 28·485 inches, and that of the Erebus 28·478 inches. At 7 P.M., we re-crossed the antarctic circle after an interval of sixty-four days that we had been to the southward of it. The event was celebrated with much rejoicing.

March 7. On the 7th we met with the first specimen of the vegetable kingdom in latitude 64° S., several small pieces of seaweed being seen during the day;
March 8. and on the afternoon of the 8th, when in latitude 62° 15′ S., and longitude 163° 50′ W., we tried the current, and found it setting N. 59° E., at the rate of seven miles and a half daily. The temperature of the sea at 600 fathoms was 39°; at 450 fathoms, 38°·5; at 300 fathoms, 37°·2; at 150 fathoms, 35°·5; and at 100 fathoms, 32°·2; that of the surface being 35°. We were astonished to find the minimum index of all the thermometers standing at 30°·8, from which it would appear that there was a cold stratum of water of that temperature, between the surface and one hundred fathoms.

March 9. Having on the afternoon of the 9th reached the latitude of 60° 20′ S., and intending to keep near the parallel of 60°, for the purpose of visiting the supposed position of the second focus of greater magnetic intensity, as well as of shortening our distance to Cape Horn, by maintaining a high latitude, we altered our course to true east, the wind from the southward favouring our intentions.

1842.

During the next three days we made rapid progress to the eastward, experiencing strong southerly winds and severe weather, but we met only four or five bergs during a run of several hundred miles, and began to think we had got to the northward of their latitude. On the afternoon of the 12th, however, several were seen during thick weather, and whilst we were running, under all the sail we could carry, to a strong north westerly breeze. In the evening the wind increased so much, and the snow showers became so incessant, that we were obliged to proceed under more moderate sail. Numerous small pieces of ice were also met with, warning us of the presence of bergs, concealed by the thickly falling snow: before midnight I directed the topsails to be close-reefed, and every arrangement made for rounding to until daylight, deeming it too hazardous to run any longer: our people had hardly completed these operations when a large berg was seen ahead, and quite close to us; the ship was immediately hauled to the wind on the port tack, with the expectation of being able to weather it; but just at this moment the Terror was observed running down upon us, under her top-sails and foresail; and as it was impossible for her to clear both the berg and the Erebus, collision was inevitable. We instantly hove all aback to diminish the violence of the shock; but the concussion when she struck us was such as to throw almost every one off his feet; our bowsprit, fore-

March 12.

1842. topmast, and other smaller spars, were carried away; and the ships hanging together, entangled by their rigging, and dashing against each other with fearful violence, were falling down upon the weather face of the lofty berg under our lee, against which the waves were breaking and foaming to near the summit of its perpendicular cliffs. Sometimes she rose high above us, almost exposing her keel to view, and again descended as we in our turn rose to the top of the wave, threatening to bury her beneath us, whilst the crashing of the breaking upperworks and boats increased the horror of the scene. Providentially they gradually forged past each other, and separated before we drifted down amongst the foaming breakers, and we had the gratification of seeing her clear the end of the berg, and of feeling that she was safe. But she left us completely disabled; the wreck of the spars so encumbered the lower yards, that we were unable to make sail, so as to get headway on the ship; nor had we room to wear round, being by this time so close to the berg that the waves, when they struck against it, threw back their sprays into the ship. The only way left to us to extricate ourselves from this awful and appalling situation was by resorting to the hazardous expedient of a sternboard, which nothing could justify during such a gale and with so high a sea running, but to avert the danger which every moment threatened us of being dashed to pieces. The heavy rolling of the vessel, and the probability of the masts giving way

each time the lower yard-arms struck against the 1842.
cliffs, which were towering high above our mast-heads, rendered it a service of extreme danger to loose the main-sail; but no sooner was the order given, than the daring spirit of the British seaman manifested itself — the men ran up the rigging with as much alacrity as on any ordinary occasion; and although more than once driven off the yard, they after a short time succeeded in loosing the sail. Amidst the roar of the wind and sea, it was difficult both to hear and to execute the orders that were given, so that it was three quarters of an hour before we could get the yards braced bye, and the maintack hauled on board sharp aback — an expedient that perhaps had never before been resorted to by seamen in such weather: but it had the desired effect; the ship gathered stern-way, plunging her stern into the sea, washing away the gig and quarter boats, and with her lower yard-arms scraping the rugged face of the berg, we in a few minutes reached its western termination; the "under tow," as it is called, or the reaction of the water from its vertical cliffs, alone preventing us being driven to atoms against it. No sooner had we cleared it, than another was seen directly astern of us, against which we were running; and the difficulty now was to get the ship's head turned round and pointed fairly through between the two bergs, the breadth of the intervening space not exceeding three times her own breadth; this, however, we happily accomplished; and in a few minutes

1842. after getting before the wind, she dashed through the narrow channel, between two perpendicular walls of ice, and the foaming breakers which stretched across it, and the next moment we were in smooth water under its lee.

The Terror's light was immediately seen and answered; she had rounded to, waiting for us, and the painful state of suspense her people must have endured as to our fate could not have been much less than our own; for the necessity of constant and energetic action to meet the momentarily varying circumstances of our situation, left us no time to reflect on our imminent danger.

We hove to on the port tack, under the lee of the berg, which now afforded us invaluable protection from the fury of the storm, which was still raging above and around us; and commenced clearing away the wreck of the broken spars, saving as much of the rigging as possible, whilst a party were engaged preparing others to replace them.

As soon as day broke we had the gratification of learning that the Terror had only lost two or three small spars, and had not suffered any serious damage; the signal of "all's well," which we hoisted before there was light enough for them to see it, and kept flying until it was answered, served to relieve their minds as speedily as possible of any remaining anxiety on our account.

A cluster of bergs was seen to windward, extend-

ing as far as the eye could discern, and so closely connected, that, except the small opening by which we had escaped, they appeared to form an unbroken continuous line; it seems, therefore, not at all improbable that the collision with the Terror was the means of our preservation, by forcing us backwards to the only practicable channel, instead of permitting us, as we were endeavouring, to run to the eastward, and become entangled in a labyrinth of heavy bergs, from which escape might have been impracticable, or perhaps impossible.

Whilst our ship lay rolling amidst the foam and spray to windward of the berg, a beautiful phenomenon presented itself, worthy of notice, as tending to afford some information on the causes of the exhibition of auroral light. The infrequency of the appearance of this meteor, during the present season, had much surprised us; and therefore, to observe its bright light, forming a range of vertical beams along the top of the icy cliff, marking and partaking of all the irregularities of its figure, was the more remarkable, and would seem to suggest that some connection existed, in the exhibition of this light, with the vaporous mist thrown upwards by the dashing of the waves against the berg, and that it was in some degree produced by electrical action taking place between it and the colder atmosphere surrounding the berg. We may here also trace some analogy between this phenomenon and those appearances of the Aurora Borealis, witnessed in Scotland by the Rev. James Farquharson,

1842. minister of the Parish of Alford, and described by him in the Transactions of the Royal Society.

March 13. At 8 A.M. we bore away before the gale, which was still blowing from the westward, under close reefed maintop-sail and foresail. If during the hour of extreme peril I had occasion to admire the cool bravery of our officers and crew, so had I now no less cause to appreciate and praise the diligence and alacrity with which they set to work to repair the damage we had sustained; and although again compelled by circumstances to continue our labour almost uninterruptedly throughout the Sabbath day, we did not fail assembling together in the forenoon to offer up our thanksgivings and praises to Almighty God, for the renewed instance of His guidance and protection which we had so recently experienced.

A portion of the crew were engaged fitting the rigging, whilst the carpenters were making a bowsprit out of the handmast, and a party was employed clearing the forehold to get at the leak, which we suspected to be in some part of the starboard bow, where we received the first shock, and where the whole of the upper works with the timbers and cathead were broken away level with the deck. The best bower anchor was found suspended about three feet below the water line, by its palms being driven between seven and eight inches into the solid wood, and remained fixed there without any other fastening to the ship, with the flukes uppermost, as may be seen in the annexed drawing by Mr. Davis;

second master of the Terror: this we considered most likely to have occasioned the leak which, though at present of no amount to cause alarm, was a source of uneasiness until the extent of the injury from which it arose was determined. After some hours' examination, it proved to be only in the upperworks, and was stopped without any difficulty. 1842.

At noon we were in latitude 60° S., and longitude 143° 48′ W., the wind still blowing strong from the westward, but gradually abating in the afternoon as it drew round to the northward. The high sea that was running hindered our operations; but we were, nevertheless, enabled to finish the jury-bowsprit, get it into its place, and secure it, with all its gear and rigging properly set up, before night. We had passed several icebergs during the day, and this, connected with our recent accident, occasioned us to run with more carefulness during the first few hours of darkness, and at midnight, several bergs and numerous fragments being met with, we rounded to until daylight.

The breeze having freshened from the westward, we bore away before it at 5 A.M., and were able, in addition to our sail of yesterday, to set the port lower studding-sail. We passed a great many bergs in the course of the day; but the wind having veered to the southward by noon, we had clear weather, and could therefore run without danger, though under more moderate sail March 14.

1842. throughout the night, during which only three or four bergs were seen.

March 15. Our broken spars and rigging having been replaced, we made all sail when daylight appeared, steering directly for the supposed position of the focus of greater magnetic intensity, which I had not relinquished my intention of visiting. From the necessity of keeping the ship exactly before the wind for the last two or three days, we had run sixty miles to the northward of it, we were now, however, in a condition to regain the parallel of 60° of south latitude.

Favoured by clear nights, we pursued our course at a moderate pace; and during the continuance of daylight pressed all the sail on the ships they could carry; for as we were yet between two and three thousand miles distant from the Falkland Islands, we were compelled to hazard a little rather than prolong our voyage so much by rounding to during the lengthened period of darkness.

March 18. At daybreak on the morning of the 18th we had reached the desired spot in latitude 60° S., and longitude 125° W.; and although it was blowing fresh from the westward, and the gale of the preceding day had occasioned so heavy a swell that our ship rolled and tossed about considerably, yet we obtained numerous magnetic observations, which, if not so accordant as they would probably have been under more favourable circumstances, the results proved sufficiently satisfactory; and if they have not tended to confirm the theory which

brought us to this spot, they, when combined with 1842. others, will enable philosophers to determine whether, as in the northern magnetic latitudes, there be two foci of greater magnetic intensity, or whether it be not confined to one spot in the Antarctic regions, and that not very distant from the southern magnetic pole, which I rather apprehend to be fact. The means of ascertaining this important question in magnetic science, however, are now abundantly provided, and its determination will probably prove to be one of the more interesting results of our observations.

We had now no other object to divert us from a direct course round Cape Horn to the Falkland Islands, where I proposed to pass the winter, and thoroughly repair our ships, in readiness to make a third attempt to carry our magnetic researches into a high southern latitude, when the proper season for that purpose should arrive.

Impelled by strong westerly gales, we generally ran from one hundred and twenty to one hundred and sixty miles daily, when the nights were so clear as to admit of our running, although much hindered by the bower anchor, which we were unable to remove. It was, however, washed away, by a heavy sea which struck the ship during a gale on the 18th (the palms being broken off and March 18. left sticking in the ship's side), after having been carried in that extraordinary position above five hundred miles.

During the 19th and 20th, it blew a violent

1842. March 20. storm of forty hours' duration, which obliged us to heave to under the close-reefed main-topsail during the night, as we were amongst a great many bergs; the high sea running tried the rigging of our jury spars, and occasioned us a night of much anxiety.

At daylight we bore away before the gale, the sea heavy, our ships scudding well, seldom shipping any water; for, although from their construction they sailed slowly, they possessed the advantage of being admirable sea boats, whether lying to or running before a storm. Our position at noon, by observation, was latitude 59° 21′ S., longitude 114° 57′ W. By steering more to the northward, we might have got out of the region of icebergs; but we preferred keeping as far south as we prudently might, both for the advantage of shortening the distance, and obtaining magnetic observations.

The gale abated soon after noon, and we enjoyed the beautiful evening that followed: aided by the feeble light of the moon during the early part of the night, and the clear starlight after midnight, we continued our course.

March 21. At 2 A.M. we passed very close by a small berg, the white foam of the sea dashing over it rendering it conspicuous against the dark sky beyond.

At noon we were in latitude 59° 9′ S., and longitude 111° 18′ W., the magnetic dip 71° 41′ S., and the variation 20° 52′ E. The temperature of the sea, which had been warmer than the air for some

days past, rose to 41·5, that of the air being 38°. 1842.
The sea was observed, also, to be of a clear light blue colour. The sooty albatross, the only bird seen lately, was in considerable numbers.

It was a fine clear evening, but we still looked in vain for the aurora australis: last year, at this period of the season, in nearly the same latitude, and about one hundred degrees of longitude to the westward, we had splendid exhibitions of it almost every night; from which it would seem that its occurrence in some degree depends upon local causes, which, therefore, its total absence in this part of the southern ocean may assist in explaining.

A moderate breeze from south-west, we hove to March 23.
at 1·30 P.M., in latitude 58° 36′ S., and longitude 104° 40′ W., and tried for, but without obtaining, soundings, with 600 fathoms of line: the temperature at that depth was 40°; at 450 fathoms, 40°·5; at 300 fathoms, 40°·8; at 150 fathoms, 40°·7; at 100 fathoms, 40°·8; at 50 fathoms, 40°·8; and, at the surface, 41°; that of the air being 32°. The specific gravity throughout being 1·0277 at 43°·5 of temperature. These experiments show that we were very nearly on the line of uniform temperature, which here appears to be about a degree higher than we have found it in other parts of the ocean, and also rather further to the southward.

Many black-backed albatross, and a few stormy and blue petrel were seen, as were also two pen-

1842. guins, although we were more than a thousand miles from the nearest land.

March 27. Favoured by westerly breezes and fine weather, we made good progress during the next few days, without anything occurring worthy of remark, and at noon the 27th were in latitude 59° 02′ S., and longitude 87° 21′ W. The magnetic dip had diminished to 67·30 S., and the variation was 26° 28′ E., our distance from Cape Horn rather exceeding 600 miles. During a violent hail squall this morning some of the balls which fell measured nearly two inches in circumference. The Skua gull, stormy and gigantic petrel, a few sooty albatross, and a large company of bottle-nosed whales were seen during the day.

March 28. The weather being fine the next day, and the water smooth, we made some experiments on the temperature of the sea; those of the 23d having given a different result from what we had expected, and had found in other parts of the southern ocean. The thermometers employed were again compared with the standard, and, as the temperature of the sea and air was nearly the same, the observations were made altogether under still more favourable circumstances, and again the same anomalous result was obtained; for, at 600 fathoms, it was 40°; at 450 fathoms, 40°·5; at 300 fathoms, 40°·8; at 150 fathoms, 40°·8; at the surface, 42°; the air being at 40°: our position at this time was latitude 58° 55′ S., longitude 83° 16′ W. These experiments were repeated on the 29th and 30th with precisely

similar results, so that we must come to the conclusion, either, that the line of uniform temperature of the ocean in these meridians is nearly half a degree higher temperature than at the places we had previously crossed, or that some inexplicable change to that amount had taken place in our standard thermometer, and which the comparison with the several other thermometers gave me some reason to suppose had occurred. The annexed abstract from the meteorological journal of the Erebus will furnish every information respecting the climate of these regions during the month of March. The mean position of the mercury in the barometer in the higher latitudes of the Antarctic regions was nearly an inch lower than in other parts of the world, and constitutes a most remarkable and interesting phenomenon in terrestrial physics, which I shall have occasion to notice more fully hereafter. 1842.

1842.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—MARCH, 1842.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temp. at 9 A.M.	
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in shade.	Dew point.
	° ′	° ′	°	°	°	°	°	°
1	69 52	180 00	27	24	26·1	29·0	26·5	13
2	68 04	176 35	31	26·5	29·0	31·0	28	28*
3	67 28	174 27	37·5	30	32·3	32·6	32	28
4	67 30	171 47	33	31	31·8	31·7	31	31*
5	67 08	171 38	34	29	31·1	32·2	32	28·5
6	65 06	167 39	39	28·5	32·1	32·9	32·5	24
7	63 30	165 38	32·5	29	30·5	33·6	30·5	22
8	62 16	163 50	34·5	29·8	32·0	34·6	31·5	24
9	60 57	160 49	34·5	32	33·0	35·9	32	24
10	60 18	156 07	34	30	32·5	35·5	31	26
11	60 18	151 32	37	33·5	35·7	34·8	36	36*
12	60 12	147 25	38	34·5	35·9	34·9	35	32
13	60 00	143 48	39	35	36·4	35·1	36	32
14	59 23	141 27	38	35·7	36·8	35·8	36	35
15	58 50	137 26	40·2	35·7	37·8	37·2	37	33·5
16	59 01	132 28	38·8	37	37·8	37·6	37	31
17	59 39	127 12	39	36	37·0	36·6	38	37
18	60 21	122 50	40	36·5	38·1	38·2	38	34·5
19	60 02	118 55	39	35	36·6	38·6	37	29
20	59 21	114 57	40·2	35·5	36·3	39·3	37	37*
21	59 09	111 08	38	35	37·0	40·4	35	35*
22	58 28	108 00	38	33	34·8	40·4	34	28·5
23	58 36	104 48	33·5	31	32·2	40·4	33	23
24	58 51	101 26	39	34	36·2	41·2	36	24
25	58 56	96 08	41·7	38	39·0	41·3	40	30·5
26	59 02	91 30	41	35	38·1	41·8	38	34·5
27	59 02	87 21	40·5	35·5	36·9	41·7	36	31
28	58 55	83 28	40	35	36·6	41·9	36	32
29	58 22	79 50	44·2	35·5	37·8	42·2	38·5	25
30	58 28	77 28	46·5	37	41·9	42·8	38	34
31	58 34	74 20	42	38	4·02	42·6	40·5	31·5

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—MARCH, 1842.

1842.

Days.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	28·731	28·562	28·640	Easterly.	4	A.M. 4 b.c. P.M. 2 b.c.g.p.s.
2	·724	·631	·659	East.	4	3 b.c.p.s.
3	·702	·554	·642	Northerly.	A.M. 1 P.M. 4	3 b.c.g. 0 q.p.s.
4	·547	·178	·345	N.N.E.	A.M. 8 P.M. 5	0 q.p.s. 3 b.c.
5	·489	·363	·407	S. Westerly	A.M. 2 P.M. 5	2 b.c.g.p.s.
6	·570	·423	·468	A.M. W. by N. P.M. Southerly	4 2	5 b.c.q. 2 b.c.g.m.
7	·694	·596	·651	S.S.W.	3	0 g.p.s.
8	·813	·644	·712	Southerly	2	3 b.c.g.
9	29·060	·817	·927	Southerly	3	3 b.c.g.p.s.
10	·352	29·075	29·219	A.M. S.S.E. P.M. W.S.W.	4	3 b.c.p.g.s.
11	·373	28·779	28·970	S. Westerly	7	A.M. 0 q.r. P.M. 3b.c.q.s.
12	·488	29·050	29·279	N.N.W.	A.M. 2 P.M. 5	2 b.c.g.m. 0 d.s.m.
13	·475	·160	·330	S. Westerly	5	3 b.c.q.p.s.
14	·720	·094	·335	S. W.	5	A.M. 0 d.g. P.M. 3b.c.p.s.
15	·884	·738	·820	West	5	2 b.c.g.
16	·932	·794	·848	W.S.W.	A.M. 5 P.M. 4	1 b.c.p.r.s. 3 b.c.d.g.
17	·764	·461	·591	W. by S.	6	0 q.r.
18	·701	·018	·476	A.M. S.Westly. P.M. Westerly	5 6	2 b.c.g. 0 g.r.
19	·103	28·827	28·995	S. W.	9	3 b.c.q.r.s.
20	28·950	·767	·882	A.M. S.W. P.M. South	9 5	2 b.c.q.s. 4 b.c.p.s.
21	29·188	·905	29·028	S.E.	A.M. 4 P.M. 5	0 g.q.p.s.
22	·277	29·170	·239	A.M. S.S.E. P.M. S. by W.	5 3	1 b.c.g.p.s. 3 b.c p.s.
23	·188	28·893	·026	South	3	2 b.c.g.p.s.
24	·216	·991	·130	A.M. South P.M. W.S.W.	4	A.M. 3b.c.q.s. P.M. 0 g.p.s.
25	28·993	·882	28·928	S.W.	6	A.M 0 g.q.r. P.M. 2b.c. ph
26	·886	·601	·684	W.S.W.	3	0 g.q.p.r.s.
27	·634	·569	·600	W.S.W.	4	3 b.c.p.q.h.
28	·949	·646	·773	Westerly	3	3 b.c.p.q.h.s.
29	29·071	·963	29·037	A.M. S.S.W. P.M. N. W.	3	A M. 4 b.c. P.M. 4b.c.p.q.s.
30	·025	·625	28·868	N.N.W.	3	0 g.p.r.
31	28·595	·367	·443	A.M. N.W. P.M. W.S.W	5 3	3 b.c.q.r. 3 b.c.q.s.
	29·932	28·178	28·9662		4·30	

1842. April 1. Strong breeze from the westward, with fine weather; but there was too much sea to admit of our trying for deep soundings, which I much wished to do, as to-day, at noon, we were only seventy-two miles from Diego Ramirez rocks, being in latitude 59° 20′ S., and longitude 70° 23′ W. It was remarkable that we could not perceive any indications of our approach to land; the ocean preserved its clear blue colour; there was no seaweed, and but few birds to be seen: but this may arise from the current, which we found setting to the eastward at the rate of from twelve to sixteen miles daily, which would carry away with it all the seaweed that might be torn from the rocks, and which would be followed by the sea fowl in search of their food, consisting of shell-fish and other marine creatures, which attach themselves to its stems or leaves, and find a shelter amongst its denser patches.

At 8 P.M. we passed due south of Diego Ramirez rocks, at about twenty-two miles distance; and having run till midnight, we hove to, and tried for, but did not obtain, soundings, with two hundred fathoms of line. We now hauled up N. by E. for
April 2. Cape Horn, which I wished to sight at daylight; but the wind suddenly shifted to the N.N.E., and frustrated my intention, compelling us to stand to south-eastward, as the rapidly-falling barometer and threatening aspect of the sky gave us notice of a storm: this came on before noon, at which time we were in latitude 57° 25′ S., longi-

tude 67° 36′ W., Diego Ramirez rocks bearing N. 33° W., distant sixty-seven miles. 1842.

As the gale increased, we close-reefed the topsails, and were in the act of reefing the courses at 2 P.M., when James Angelly, quarter-master, fell from the mainyard overboard: the life-buoy being instantly let go, he swam to and got upon it with apparent ease, so that we now considered him safe. Although there was too high a sea running for any boat to live, yet Mr. Oakley and Mr. Abernethy, with their accustomed boldness and humanity, were in one of the cutters ready to make the attempt: I was obliged to order them out of the boat, for the sea was at this time breaking over the ship in such a manner as to make it evident that the cutter would have instantly filled, whilst, by making a short tack, we could fetch to windward of the buoy, and pick him up without any difficulty; we therefore made all sail on the ship, and stood towards him: but just as we got within two hundred yards, the wind headed, and obliged us to pass to leeward, so near, however, as to assure us of being able to fetch well to windward, after a short board. He was seated firmly on the buoy, with his arm round the pole, but had not lashed himself to it with the cords provided for that purpose, probably from being stunned or stupified by striking against the ship's side as he fell overboard. In a quarter of an hour we again stood towards him, with the buoy broad upon our lee bow; but, to our inexpressible grief, our unfortunate shipmate

1842. had disappeared from it. We dropped down upon it so exactly, that we could take hold of it with a boat-hook; and, had he been able to have held on four or five minutes longer than he did, his life would have been saved; but it pleased God to order it otherwise. This melancholy event cast a gloom over all his companions, by whom he was much esteemed, as well as greatly respected by his superiors.

In the evening the gale abated, and gradually drawing round to the south-west, enabled us to resume our course to the north-east during the
April 3. night; and next morning, being to the eastward of the Diego Ramirez rocks and other islets, many patches of seaweed were met with, the water fowl were also very numerous; besides those of the usual kinds, we observed a *chionis*, different from that we found at Kerguelen Island, and therefore probably a new species.

At noon, our observations placed us in latitude 56° 41′, longitude 65° 9′ W.; and during the two days we were rounding Cape Horn, we had been carried thirty miles to the north-east by a current. Beauchêne Island, which we were now steering for, bore N. 41° E. 319 miles.

At 5 P.M. a brig was seen under close-reefed topsails and balanced mainsail, standing to the southward: her appearance created no small sensation, being the first vessel we had seen since our departure from New Zealand more than four months before. It was blowing too hard to communicate,

but we hauled up two or three points to run close past her, showing a light, which she answered. We carried a press of sail during the night, and advanced rapidly on our course, being once more fairly on the Southern Atlantic Ocean. 1842.

Blowing a strong breeze from the westward, with frequent squalls and showers of rain, we derived advantage from being under the lee of Staten Island, which we passed at a distance of about fifty miles, but without seeing it, owing to the haziness of the atmosphere. At 6 A.M. we crossed a strong tide ripple, or meeting of currents, along which many beds of the beautiful macrocystis were collected together; and the colour of the ocean changed at once from a clear blue to an olive green. April 4.

At 8 P.M., when in latitude 53° 59′ S., and longitude 60° 47′ W., some bottles were thrown overboard, each containing a request that whoever found it would forward the enclosed paper to the secretary of the Admiralty, with the locality and date, in order to determine the set of the current in the vicinity of Cape Horn. It was my practice occasionally throughout the voyage to throw over several bottles at the same spot, made to float with different degrees of buoyancy, by loading them with unequal weights of fine dry sand; the deepest of these would of course be more influenced by the current than the prevailing wind; the lightest, on the contrary, would be carried forward on its course more by the wind than

1842. the current; those floating at intermediate depths would serve to show more nearly the joint effects of both. The vicinity of Cape Horn was considered by me an eligible locality for one of these experiments; and I mention it more especially here on account of one of the bottles having been found near Cape Liptrap, in the neighbourhood of Port Philip, Australia, about the middle of September, 1845. The notice of the circumstance, which was first published in the Port Philip Herald, was copied into the Scotsman, from which paper of the 26th August, 1846, the interesting particulars of the course and distance the bottle had drifted have been extracted and placed in the appendix. The editor observes: "That the motion of the bottle must have been eastward, and assuming that it had newly reached the strand, when discovered, it had passed from the vicinity of Cape Horn to Port Philip, a distance of *nine thousand miles*, in three years and a half. But it could not be supposed that its course was exactly straight; and, if we add a thousand miles for detours, it follows that the current which carried it moved at the rate of *eight miles per day*."

As no mention was made of any sand being in the bottle when found, it was doubtless the lightest of the five which I threw overboard this evening, and had been hurried forward on its course by the strong westerly winds which blow in the parallel of latitude it had traversed, with much greater force, and with almost equal constancy, as do the

trade winds of the equatorial regions in the opposite direction. The bottle in its course will have travelled nearly along the track of our ships in 1840, past the Crozet and Kerguelen Islands, on our way to Van Diemen's Land, where we found, on an average, a daily current of fifteen miles carrying us to the eastward during the months of April, July, and August.* It would be most interesting to ascertain what had become of the other bottles that were thrown overboard at the same time with that found near Cape Liptrap. 1842.

The wind veered to the southward during the night, and moderated considerably before daylight the next morning. At 5 A.M. Beauchêne Island was seen bearing N.N.E., directly a-head of us, and, the weather being fine, we sailed close past it. Even this desolate rock was an object of interest to us, after having been out of sight of land for a period of one hundred and thirty-six days. April 5.

At noon, the Sea Lion Islands were visible from the maintop with the long reef of rocks and breakers to the eastward of them. The wind fell light in the course of the afternoon, and before midnight it was perfectly calm. We were in soundings all night varying from thirty-five to sixty fathoms, very irregularly, on a bottom of coarse sand and shells. At 5 A.M. a breeze sprang up from the eastward, against which we had to beat for several hours before we could weather Cape Pembroke, April 6.

* See Vol. I. p. 97., and Appendix, p. 333.

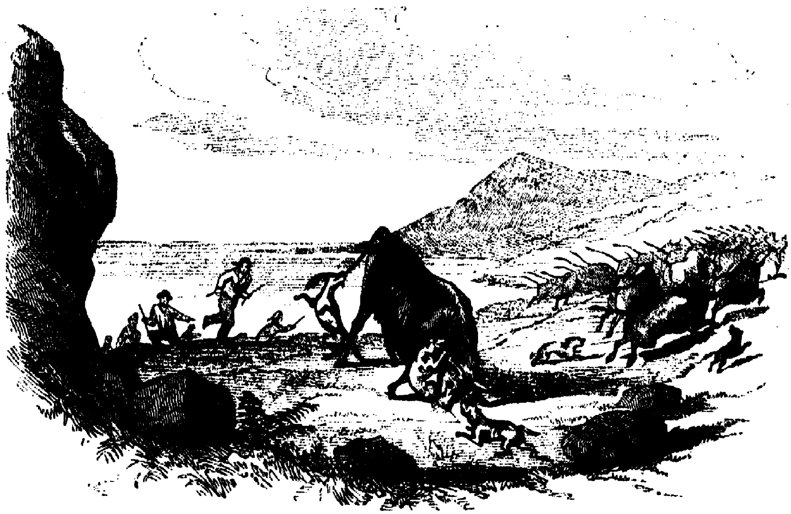
1842. the extreme point of East Falkland Island. At 2 P. M. we rounded the Seal rocks, which lie off the Cape, and bore away for Port Louis. By this time the wind had freshened from the north-east, and the fog soon afterwards came over so thick that we could not see above a quarter of a mile before us; but, guided by Captain Fitzroy's excellent chart, we ran up Berkeley Sound, without hesitation, and were fortunate in hitting the narrow entrance of Port Louis, in which we anchored soon after 5 P.M. in five fathoms, nearly opposite the settlement; but without having been seen by any of the inhabitants, owing to the thick fog which prevailed.

Mr. Hallett, the purser, was sent on shore to procure a supply of fresh beef and vegetables, with which he returned in less than an hour; and although we were all greatly disappointed at our letters from England not having yet arrived, we had the high gratification of learning, that Commander Crozier, Lieutenant Bird, Mr. Smith, mate, and Mr. Mowbray, clerk in charge of the Terror, had been promoted on the day my report reached the Admiralty of our first season's operations in the southern regions — an event which gave much pleasure to all their companions, by whom they were deservedly esteemed, and there was great rejoicing on the happy occasion.

As the services of these officers were indispensable to the expedition, I appointed Commander Bird as additional commander of the Erebus, and Lieutenant Smith into the vacancy thus occasioned;

Mr. Mowbray was at the same time appointed purser of the Terror; all of which appointments were subsequently confirmed by the Admiralty. 1842.

Mr. Hallett acquainted me that Lieutenant Moody of the Royal Engineers was at present Lieutenant-Governor of the settlement, having arrived so recently as January last, and succeeded Lieutenant Tyssen, commander of Her Majesty's ketch, Sparrow, who up to that period had been in charge of the Falkland Islands.



Sketched by Dr. Hooker.

Hunting Wild Cattle in the Falkland Islands. Page 248.

CHAPTER IX.

Land the Observatories. — Shooting Parties. — Account of a Wild Cattle Hunt. — The Ships hauled up to repair. — Arrival of Her Majesty's Ship Carysfort, with Provisions and Stores. — Refitment of the Ships. — Port William. — Removal of the Settlement from Port Louis to Port William. — Botanical Notice. — Grasses. — Balsam-Bog. — Flowers. Lichens. — Seaweeds. — Mosses. — Ferns. — Esculent Plants. Tussock Grass of the Falkland Islands.

CHAPTER IX.

EARLY the next day, accompanied by Captain Crozier, I called upon the Lieutenant-Governor, and was informed by him that the settlers were on short allowance of bread and flour, the supplies from Buenos Ayres, upon which they depended, not having yet arrived. 1842. April.

It was fortunate that out of our abundance we could spare as much as they would for the present require, and which they would be able to replace before our departure again for the South. In consequence also of nearly all the Gauchoes having left the settlement, the government stock of cattle was reduced so low that we could only get fresh beef every alternate day for our people, and of vegetables there was not sufficient in the government garden to furnish one table daily; of these the governor generously gave to our officers a large proportion, as also of the scanty allowance of milk and butter the dairy afforded.

As an abundance of fresh beef for our crews was of first importance, I obtained the governor's permission to send a hunting party to supply the ships during the whole period of our stay, paying for whatever they could provide the same price as was at the time of our arrival charged to the settlers for what they purchased from the government

1842. April. store. The service, was, however, of too dangerous a nature for those unacquainted with it to enter upon without due caution; for many are the narratives of hair-breadth escapes, of severe injury, and of death, that are related by those who have been much engaged in hunting the wild cattle of the Falkland Islands; I therefore considered it better to wait the hourly expected arrival of Her Majesty's ketch, Arrow, commanded by Lieutenant Robinson, who had been several years employed in the survey of the numerous harbours and inlets with which the islands abound, that from her people, who were accustomed to the sport, our hunters might receive the necessary instructions and assistance until they should be able to do without them; and more especially on account of the dogs, which had been trained for the purpose, and were essential to the safety of the hunters, being on board the Arrow, always accompanying the vessel to provide fresh provision for her crew whilst engaged in their arduous duties.

In the mean time, however, shooting parties were sent out every day, and procured a great number of rabbits, and various kinds of birds. Of these the teal, snipe, and upland goose were the most delicious, and afforded a wholesome and useful variety in the diet of the crews.

The astronomical and meteorological observatory was placed near the fort, built by Bougainville in 1764, for the protection of his settlement, at an

elevation of sixty-eight feet, and the magnetic observatory nearer to the ships in a more protected situation and thirty-six feet above the level of the sea: two huts were erected close by it for the accommodation of the officers and men employed at the observatories, and our usual series of magnetometric and other observations were commenced on the 15th of April. 1842. April.

The astronomical observations and pendulum experiments, in which I was assisted by Captain Crozier, were begun soon afterwards, and a series of more than ordinary extent obtained, with the view to arrive at the cause of the great and inexplicable discordance between the results of the French navigators, Captain Freycinet and Captain Duperrey at this place.

Captain Duperrey fixed his observatory amidst the ruins of the settlement of Saint Louis; but as there did not appear to have been any mark left on the spot, we could not determine its position with the desirable exactness, and our subsequent observations prove that our observatory was about half a mile to the southward of the situation of his. He states in his *Voyage autour du Monde*, p. 98. that the difference in the latitude of his station and that of Captain Duperrey was 3′ 32″ and the longitude 3′ 43″, the latter station being on an island to the south-eastward, called by the French the "*Isle de Conti*," which is probably Hog Island of the Admiralty Chart.

The ships' companies were employed under Com-

1842. April. mander Bird and Lieutenant M'Murdo in constructing a pier, of the numerous heavy masses of loose stones that lay about convenient for the purpose, at which our boats could land at any time of tide, and thus materially facilitate the disembarkation and re-embarkation of the ship's stores and provisions, as it was necessary to take every thing out of them previous to laying them on the ground for examination and repair; and also in erecting a spacious storehouse, convenient to the pier, capable of containing the entire contents of one ship, completely protected from the inclement weather we had reason to expect, by a close thick thatch of Tussock grass.

Whilst these preliminary measures were being proceeded with, Lieutenant Robinson arrived in the Arrow towards the end of April; and as the period of her stay was limited, a party was immediately sent off to Port St. Salvador, whose deeply indented shores he recommended as best adapted for a hunting station. One of the ship's boats was carried over the narrow neck of land that separates the westernmost part of Port Louis from Port St. Salvador, and in it the party embarked, accompanied by some of the Arrow's best sportsmen and the dogs, intending to pitch their tents on the western shores of the Port.

The party appeared to have lost no time; for in two or three days we received the substantial assurance of its success and exertion, in a supply of twelve hundred weight of beef; and I am glad

to have the opportunity of introducing here an interesting account of the wild cattle hunt, furnished to me by an officer who accompanied the party in their first successful chase. 1842. April.

"After a wet and weary pull of three hours, which carried us no more than as many miles, we approached the hunting grounds on the western shores of St. Salvador Bay. There we descried, through the drizzling sleet, a herd of some fifteen cattle on a point of land: a sight which put us all into excellent spirits. The dogs were immediately seized, and held down in the bottom of the boat; for their habit is, even on scenting the animals, to plunge into the water, and by giving tongue, frighten the game far away before the party can reach the shore. The men were all eagerness, stripping to their Guernsey frocks and trowsers, each slinging a sharp knife round his waist. My companion and I loaded our rifles, knowing that for new hands to keep up with the runners was impossible; and that our only chance of glory lay in having a long shot at some pugnacious bull or fleeing cow, which, inglorious as it may sound, is no more so in reality than if the game were a deer, and infinitely less than if a hare or bird.

"Before, however, detailing the incidents of this particular chase, I may give an outline of the general features of a cattle-hunt, as pursued by our seamen, which differs considerably from that of the Gauchoes; and most prominently in not involving those revolting cruelties which the latter practise, sometimes heedlessly, but oftener to gratify a childish revenge for the toil incident on a hard hour's or day's work, and not seldom out of mere wanton wickedness. Horses and lassos we never used: strong dogs and nimble feet being all that are absolutely required; though a couple of rifles are generally necessary; for the bulls attain a size and ferocity of which we had previously little

1842. April.

idea, and they sometimes gallantly defend the herd. The dogs were of no particular breed; they were powerfully built and fleet, appearing to have more of the Spanish pointer than any other blood in them: a cross of the Newfoundland, mastiff, bull-dog, and even coach-dog, was sufficiently obvious in one or other of the best. All were very courageous; and new ones introduced into a good pack take instinctively to the habits of the old. It is very seldom that they will attack a full-grown bull, which is not wonderful, for the old Falkland Islands' 'Tauro' is the largest of its race: its neck is short and of prodigious depth: the skin of one we killed was upwards of two inches in thickness, and its head half as large again as that of an ordinary bull: they are generally black, have a noble carriage, and are possessed of indomitable courage and untameable ferocity. Specimens of these dimensions are however rare and do not mix with the other cattle, though sometimes attending them. More frequently they are seen solitary on the hills, with erect crests and distended nostrils, looking defiance at the passing traveller, and sometimes flying at him unprovoked; when he must betake himself to a bog, a 'stream of stones,' or cliff. Should no such refuge be nigh, the last resource is, (as I am told by those whom I believe to have practised the *ruse*,) to drop suddenly on the ground; when the bull starts aside from the unwonted obstacle in its path and pursues its onward course. When provoked and infuriated on open ground there is no escape even thus: the brave gunner of the 'Erebus' was struck down and the turf torn up in furrows on each side of his body by the diverging horns of a wounded and maddened bull; and my friend Capt. Sulivan bears the mark of a wound on his head which he received under precisely similar circumstances: in both these instances the animals were providentially shot before returning to gore.

"The cows are of the size of the ordinary Ayrshire stock: they invariably flee man, and seldom offer any effectual

resistance to the dogs. They herd, with the young bulls and heifers, in numbers of ten to thirty, roaming more or less, but particularly attaching themselves to tussock grounds. Those who know cattle in our parks only, or even on the hills of Scotland, can form no idea of their speed and strength; and we found that it took three powerful dogs to 'moor' (as our sailors termed it) one full-grown cow.

"The plan of attack is very simple: the object is to take as many animals out of one herd as possible. We had only dogs enough to hold one cow at a time, which is despatched by the hunter before the same dogs are free to follow the herd and detain another. Hence speed is the first requisite for this kind of chase. Shooting forms no part of the hunter's duty; as it is evident that he must be wholly disencumbered for running. Though stalking down and shooting the cattle (thus adding to the commissariat by powder and ball) is both exciting and advantageous, still the rifle-man is comparatively an idler, except in the case of an attack from the bulls; for he can only secure one or two, according to the number of his barrels, at the opening of the hunt; whilst the runner must keep on as long as there is a possibility of the dogs overtaking even a heifer. To resume the narrative: the sagacious dogs showed, by their eager looks and panting, that they understood the cause of and partook in our excitement, and were with great difficulty held down. We landed on the point, screened from the herd, and cautiously wound round a hill; till we were opened to the view of fifteen fine cows, young bulls and heifers, which threw their tails into the air, and, with an awkward bound and fling up of their heels, set off for the interior at a pace of which I hardly thought cattle capable. The dogs, already loose, sprang after and overtook them in a quarter of a mile. The runners of the party, in light shoes, long accustomed to the exercise, flew rather than ran in their wake; whilst my companion and self, each equipped

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with heavy ordnance rifle, cartouch-box, ammunition and accoutrements, pea jacket, fishermen's boots and sou'-wester, took long shots (of about three hundred yards), to the imminent danger of the runners, and then floundering along over balsam-bogs, tussock clumps, and 'diddle-dee' bushes, arrived thoroughly blown at the top of a hill immediately overlooking the scene of action. The herd was hieing off in the distance; all but one fine cow which the hounds detained. 'Yorke,' a noble dog, held her by the throat: 'Laporte,' his scarcely less powerful comrade, had seized the middle of the tail; and 'anchored' her, in spite of kicks and struggles, which caused him to twist round and round as if on a pivot; whilst little 'Bully,' a smaller more mastiff-like dog, had fixed his teeth into the poor brute's tongue, and all were mingling their snarls and stifled barks with her pitiful moans. It was a most cruel sight; but happily her sufferings did not last long. A runner, scarcely less fleet than the hounds, was already up with his knife, and quick as lightning hamstrung both hind-legs: she fell with a deep agonised *low* to the ground: he sprang to her shoulder like a savage, and before she could turn her head to *butt* plunged the steel into her neck; when she rolled over, a dying creature. One fierce dog thrust his muzzle into the gaping wound, and the others were already lapping the blood: they were kicked off with violence, and with the men started like the wind after the herd; for so short a time did all this take, that the remainder of the cattle were still in sight. A young bull and heifer were in like manner consecutively seized by the dogs, hamstrung and despatched by these swift-of-foot men, who then gave up the chase. They next cleaned, skinned and quartered the animal last killed with marvellous celerity, and returned to the second; each bearing a quarter on his shoulder, its fibre still quivering, as it appeared, from the effects of the hard run, so abruptly brought to a close. The second was treated in like man-

ner, and transported to that first slain; beside which I had remained. Not being able to carry all to the boats, the latter was cleaned and spread open on the turf, with the hide uppermost; to protect it from the carrion hawks and vultures which were wheeling in flocks over our heads. First however a fine piece was cut out, with enough of the hide to wrap completely round it and provide a supper of '*carne con cuero*' for all hands.

"In the mean time darkness and heavy sleet had overtaken us, with a bitter S.W. wind: no one in the excitement of the chase had used the precaution of observing the bearings of our landing-place; and we were soon completely bewildered amongst the innumerable little points that project into the bay, and the fingering lagoons that ramify inland. For several hours we stumbled along the muddy and rocky shore, before we found the individuals who remained with the boats; and whose halloos the wind carried away from us; whilst their beacon fire was wholly obscured by the thick sleet. Arriving at midnight, very cold, drenched and weary, we were delighted to find a roaring fire of 'diddle-dee' ready to cook our supper, for which the party had been most anxiously looking out. It was easily prepared: the lump of beef was wrapped tight and sewn into the hide; then thrown upon the fire, which, when fed with fresh marrow-bones, burned fiercely. In about an hour the '*carne con cuero*' was taken out, looking like a red-hot cannon-ball; for the skin formed a hard charcoal case round the flesh: after cooling, it was opened, and showed a piece of deliciously flavoured, but rather tough beef, stewed in its own gravy. The tents had been pitched on a bed of shingle, the only dry ground in these spongy islands: the melting snow from the tent sides drained off underneath it; and though hard, this bedding accommodates itself, by a little *bumping*, to the projections of the body, and is tolerably comfortable as long as one is content to keep in the same position. After supper we jumped into our

1842. April. blanket bags, drew a sail over us; and, never too tired for our pipe and glass of grog, my companion and I yarned for an hour; when the nature of our conversation led to the following remarks.

"Like all similar sports, requiring little superiority of intellect or cunning, and involving much bloodshed, we agreed in pronouncing this to be a barbarous exercise, which, however exciting and manly in its pursuit, should only be practised as a duty, and not indulged in for amusement only. The death by violent means of any creature innocuous to man should excite sympathy in the well-regulated mind, proportionably to the defencelessness of the sufferer: whilst the sight of one of the larger animals, helplessly weltering in its own blood, is not only painful but revolting. The temporary excitement, or the opportunity of rejoicing in one's own power or prowess, which leads the sportsman in the field to thirst for the slaughter of the deer at home, or of the cattle in the Falklands, but which so deserts him elsewhere that he shuns the sight of the shambles, cannot be wholesome: for it renders him callous to the cry of pain, though inflicted by himself, and it has a purely selfish object. We had turned our heads away when the cow was slaughtered; and walked off whilst the butcher quartered it, and so we remembered having left, in Kerguelen's Land, the first sea-bears we killed, till cold, before we could with untroubled minds assist in their transportation: so, too, it was not without remorse that the first sea-leopard was lanced on the ice; whose bravery before death, and mild supplicating eye when writhing under the spear, seemed to ask if passive courage deserved such a fate, if it were meet that any other motive than stern necessity should tempt a generous foe to witness a gallant endurance of wrongs, which the sufferer can neither avert nor requite. We found that being habituated to these sights blunted our feelings of sympathy: a deterioration of mind which, in educated men, may lead to no mischief,

but which has this effect with the savage or but partially civilised subject. No one, knowing the barbarities practised by the inhuman Gauchoe, who mutilates his fellow-creature for the gratification of revenge, can doubt of these atrocities being the fruits of a love of cattle-slaughtering, which he adopts as his profession from a blood-thirsty disposition. It is a law with him to kill: any opposition on the part of his victim to his fulfilling that law is an offence against himself; which he makes it a duty to punish: hence the wanton cruelty he practises on the poor cattle in the hunt, and hence the torturing of his prisoner or captive in war. I never afterwards passed the spot where the bones of the treacherously murdered Brisbane lay bleaching in the sun, and whither his body had been dragged at the heels of the Gauchoes' horses ere life was extinct, but conscience whispered that the motives which induced me to join in the cattle hunt, to which neither duty nor necessity called me, were those which, when fostered in untutored breasts, whose passions were unrestrained, led to as foul a tragedy as ever disgraced humanity. That they produced effects in us, the following little anecdote will show: its sequel was a subject of bitter regret to all concerned in it.

"The wild horse roams at large, in troops of twenty to forty over the northern parts of the Western Island; and has often afforded sport, especially to the Gauchoe, when no other game was at his mercy. Shortly before leaving the islands, we had heard of a fine heifer having herded with a troop of horses; and knowing that it would be long before we should again taste fresh beef, of which the ships had lately run very short, the said heifer became the desire of our mess. A party with five guns and a dog was formed, and left Berkeley Sound early one morning, with the intention of capturing the young wanderer. During a twelve miles' walk, the subject of eating horse-flesh was discussed; and the grim prospect of spending a season in

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April.

the ice, without fresh meat, determined us, failing the heifer, to secure a colt, dead or alive. Wild horses, when provoked, are dangerous to unarmed men, who are sometimes trodden down by the troop, or kicked and severely bitten by some champions of their number: we therefore took precautions intended to avoid both risk to ourselves, and the necessity of killing any thing but the heifer or a colt. The horses were discovered on the broad brow of a hill, down which ran two parallel 'streams of stones,' some sixty yards apart; the latter offering us an excellent refuge, as no hoofed animal can advance upon such loose angular blocks of quartz; and we managed to get the troop between these 'streams.' Though poor of their kind, the horses were noble-looking; their small heads, round barrels, clean limbs, flowing manes and tails, and, above all, their bold carriage and air of freedom, made them appear to particular advantage. A glossy black stallion headed the troop, and, with an iron-grey mare, attended by her long-legged shambling colt, seemed particularly impatient of our presence. By and by these advanced towards us, now ambling, and now at a canter, followed by their companions: they snorted, shook their wild manes, wheeled round in file, and again closing, stood stock-still, and looked defiance at our whole party. They all kept so close together, that it was impossible to single out the heifer, who impudently and awkwardly imitated the airs of its bold protectors. We therefore determined to divide a little, and to let the dog, whose impatience was all but ungovernable, loose on the troop, which would thereby be scattered; when the heifer was to be singled out and shot by one of the party; if the dog did not seize it. The loosened hound bounded forwards with a short bark; the horses eyed him, shook their heads, turned their tails towards us, and forthwith one and all began to neigh, rear, fling, and kick at the empty air; with a rapidity of motion, uniformity, and pertinacity that discomfited poor 'Yorke,' and moved us to shrieks

of laughter. Truly, thought I, the horse is brother to 1842.
the ass; yet so effectual was the defence, that the dog, April.
whose eye was on the heifer, could no where break into the phalanx. A shot was then fired over their heads, they started and sprung forwards: quick as thought 'Yorke' had the heifer by the throat; its cries and our shouts scared the troop, who started off in file for the mountains. Every man's rifle was at his shoulder, to resist firing a shot was impossible: one ball whistled through the air, and a horse drew up, stumbled forward and fell: the spirit of emulation was roused, four more shots followed, and each brought its mark to the ground. I saw the gallant grey mare bound high into the air; one true aim had pierced her heart; she rolled over—dead—and struck her colt to the ground as she fell."

Having now secured a plentiful supply of fresh beef, and the means of obtaining as much as we should require, our huntsmen, after a little practice, becoming equally expert and successful, the Arrow's people were recalled, as, from her having been in commission now nearly five years, they were naturally anxious to return home as soon as possible after their duties were fulfilled.

Lieutenant Robinson having orders to touch at Rio de Janeiro, I availed myself of so excellent an opportunity of transmitting an account of the proceedings of the expedition up to the present date, and of my future intentions, to the Lords Commissioners of the Admiralty, and to Commodore Purvis, the senior officer of that part of the South American Station; and at the same time made known to the Commodore our want of a new

1842. May. bowsprit, and a further supply of provisions and stores, should any opportunity present itself of sending them to us; but that otherwise we could do quite well upon our present resources, as I was unwilling to hazard the present healthy condition of our crew by taking them into a warm climate, until we had completed our work in the southern regions. I also sent by the Arrow all the specimens of natural history which had been collected during the voyage, which I have since learnt were conveyed from Rio to England in her Majesty's ship Actæon, Captain Robert Russell, and safely deposited in the British Museum.

The pier and storehouse being finished by the middle of May, the Erebus was completely cleared out; and, after a careful examination of the ground, she was hove up as far as we could get her at the top of high water, on the morning of the 25th, and the carpenters of both ships, and as many hands as could be of any assistance to them, were set to work to repair the damages she had sustained during the late arduous season's navigation amongst the ice.

On the 24th of May, being the anniversary of the birth of our most gracious Queen, a royal salute was fired from a temporary battery we had constructed on the beach, on which the guns and howitzers of both ships had been mounted for the occasion, and our people enjoyed an additional allowance of provisions and grog in honour of the day.

All the repairs and caulking below the water line of the Erebus being completed by the evening of the 26th, she was hauled off at high water, and moored at a convenient distance from the pier. The next few days were occupied in thoroughly cleansing and ventilating the holds, whilst a strict and careful survey of all the remaining stores and provisions was being made by officers appointed to that duty; their reshipment was commenced on the 1st of June, and finished by the 7th.

1842. May.

Precisely similar operations were commenced upon the Terror; she was laid on the ground for examination and repair on the 22nd, and hove off again on the 25th.

June 22.

In the evening of the 23rd a man-of-war was seen beating up Berkeley Sound, and on her anchoring, late at night, outside the narrows, I sent an officer on board, in case of her wanting the assistance of a pilot into the harbour. On his return, he informed me it was her Majesty's ship Carysfort, commanded by the Right Honourable Lord George Paulet, having on board a bowsprit, and a large supply of provisions and stores sent to us by Commodore Purvis, and also a quantity of private stock for which we had written to a merchant at Rio, and which must have been sent to us, at great expense, in a hired vessel, but for the kindness of Lord George Paulet in taking charge of them for us, notwithstanding the great bulk and the inconvenience attending their stowage in a vessel already deeply laden and encumbered with the

1842. public stores; for this act of great kindness we all felt most thankful to him.

The merchant at Rio, of whom we had purchased these things, afterwards sent a small vessel on speculation, laden with an additional quantity of those articles of which he thought us likely to be in want; but, from her never having been since heard of, it is to be feared that she foundered in one of the heavy gales which occurred about the time of her expected arrival at the Falklands, and that all hands, amongst whom was the merchant's brother, perished.

June 24. Early the next morning, I went to pay my respects to Lord George Paulet, taking with me Mr. Tucker, master of the Erebus, to pilot the Carysfort into the inner harbour. There was a light adverse wind, but aided by a flowing tide, and admirably manœuvred, she worked through the narrows, and anchored close to the Erebus in the afternoon. It was no small gratification to us to have it in our power to transfer to them a quantity of fresh beef, which our hunting party had sent in that morning, more especially as they could not have obtained any from the government store; and by putting our crews on salt provisions for a few days, which was rather a treat than a privation to them, we were enabled to keep the Carysfort fully supplied during the too brief period of her stay. The pleasure of again meeting with our brother officers, after having been so long deprived of such society, few people can understand, except those

who may have been similarly circumstanced; and the "holidays," as they were called, which their arrival and cordial and agreeable intercourse occasioned, were thoroughly enjoyed by us all. 1842. June.

The weather was unsettled and boisterous during their stay, and its inclemency was felt more severely by them, from their having so recently left the delightful climate and beautiful scenery of Rio de Janeiro, for the bleak snow-covered shores of the Falkland Islands.

The Carysfort sailed for the Pacific on the morning of the 7th July, giving us three hearty cheers at parting, which we as cordially returned. July 7.

With the new bowsprit, stores, and provisions, which the commodore had taken so much pains to provide for us, we felt completely set up, and that we should now be enabled to resume our explorations of the Southern Regions in as efficient a condition in every respect as on the day of our departure from England.

The refitment of the ships proceeded steadily and uninterruptedly; and by the end of the month of July they were again in perfect order and ready for sea. But as our magnetic experiments could not be completed until the end of August or beginning of September, and in order to give our people healthful exercise and useful occupation, I directed them to be employed building a wall seven feet thick, and as many high, round the spot which had been hitherto used as a burial-ground, but which was at present without any enclosure; and the

1842. July. remains of the ill-fated and barbarously murdered Brisbane, the companion of Weddell on his daring and adventurous voyage to the highest southern latitudes, were removed from beneath the heap of stones, where the Gauchoes had left them, into the burial-ground, and a suitable inscription placed over them.

At the request of the Lieutenant-governor I made an excursion to Port William, accompanied by Captain Crozier, for the purpose of forming an opinion upon the relative merits of the two harbours, and whether Port Louis or Port William is the best adapted to be the chief port of the colony in a naval and commercial point of view combined. The result of the investigation, which, owing to unfavourable weather, occupied us nearly a week, was, that we agreed in considering Port William to possess so many advantages over Port Louis, that I recommended the settlement should be removed to the former place, for the following reasons.

Port William is much more easy of access from its situation near the eastern extreme point of the island (Cape Pembroke), so that ships are almost immediately in harbour after making the land, and as immediately at sea, clear of all dangers on leaving the harbour; whereas to gain Port Louis they have usually to beat twelve or thirteen miles against the prevailing winds, a serious objection, so far as merchant or disabled vessels are concerned.

Secondly, Port William has the advantage of

Port Louis, in possessing two very secure outer anchorages, where ships, calling merely for water and refreshments, might be readily supplied without passing the narrows, in perfect safety and protection from all winds. 1842. July.

Thirdly, vessels of large size may pass through the narrows into the inner harbour of Port William (known as Jackson's Harbour) with any wind. Port Louis cannot be entered by vessels of considerable size, except under favourable circumstances, of infrequent occurrence. This advantage in favour of Port William arises from the prevailing winds blowing *through* the narrows of Port Louis, rendering it necessary to beat through them; but they blow *across* the narrows of Port William, so that ships may usually sail either in or out without making a tack; the narrows of Port William, also, have bolder and better protected shores than those of Port Louis.

Fourthly, there is a sufficient depth of water for a first-rate in the inner harbour of Port William, and ample room for twenty sail of the line; at Port Louis there is not sufficient depth of water for a large class frigate.

Fifthly, Port William has a peculiar advantage over Port Louis as a naval station in the facility with which a ship or squadron may be despatched to sea, with the wind blowing fresh from the eastward, which it could not be from Port Louis in such a case.

From these considerations it was sufficiently

1842. July. evident to us that should a large naval force ever be assembled or stationed at the Falkland Islands, the head quarters of the squadron would most assuredly be fixed at Port William rather than Port Louis.

The principal objection to placing the seat of government at Port William is the small quantity of land in its vicinity suitable to agricultural purposes; but as the chief advantages to be derived from our keeping possession of these islands are connected with maritime affairs, our opinion of the great superiority of Port William for naval purposes having been forwarded to the home government, the establishment has been since removed from Port Louis to Port William. It is desirable that this change should be extensively known, for merchant vessels, after rounding Cape Horn, very generally sight Cape Pembroke to verify their chronometers, though they seldom attempt to beat up Berkeley Sound, owing to the serious loss of time thus occasioned. Now, however, that by heaving to for two or three hours, under the lee of Cape Pembroke, they may be supplied with water and fresh provisions, many will be glad to avail themselves of so great an advantage, rather than run into any of the South American ports for supplies, where the harbour dues and other charges upon foreign vessels are extremely exorbitant.

The admirable accounts of the Falkland Islands, which have been so recently published by Captain

Fitzroy and Mr. Darwin, render any description of them here unnecessary. I need therefore only observe, that the condition of the settlement at the period of our arrival was any thing but flourishing; indeed, from all accounts I heard, rather retrograding. The number of inhabitants had considerably diminished, and amounted, at this time, to only forty-six, independent of the lieutenant-governor and his party, consisting in all of about twenty, and Captain Allen Gardiner, R.N., his wife and two children, who were intending to reside in Patagonia, as soon as an opportunity presented of getting there, for the purpose of preparing the way for a missionary teacher to be sent into the wide field which appears to be opening for their benevolent and pious labours.

The following remarks on the botanical productions of the Falkland Islands, by Dr. Hooker, will be read with much interest, as also some additional particulars respecting the Tussock-grass extracted from the "Flora Antarctica." *

"The uniform plains and grassy undulating hills of the Falkland Islands betoken at first sight a country of little interest for the botanist; and a closer inspection proves this to be, to a certain extent, the case. The species are few in number, these two large islands containing hardly one hundred and twenty flowering plants, and their

* Part xxii. p. 385.

1842. vegetation consisting chiefly of such natives of the rainy and storm-vexed mountains of Fuegia, and of the arid coast and plains of Patagonia, as can endure those sudden vicissitudes from heat to cold, and from damp to dry, which the climate of the Falklands presents. The position of the islands in question, about equally approximated to both the above-named countries, might naturally seem favourable to their receiving a like share of the vegetation of each. *Grasses* and the *balsam-bog* (*Bolax glebaria*) form the chief, and indeed the only conspicuous botanical feature in the landscape. During the whole year they cover the hills, the peat-bogs, the plains, the coasts, and outlying islets. In the latter situation, the *Tussock* chiefly thrives in its greatest luxuriance, appearing like a forest of miniature palms; and this being the most important among the Falkland Island plants, it deserves to be noticed first. The similarity between the *Tussock-grass* and a small palm-tree is due to the curious mode of growth of the former. Each plant forms a hillock of matted roots, rising straight out of the ground, and a few feet or more apart from the roots of the surrounding Tussock plants. The hillocks are often six feet high, and four or five in diameter, and they throw out from the summit the copious grassy foliage, with blades full six feet in length, drooping on all sides, those of opposite plants meeting, so as to over-arch the spaces between. Thus a *Tussock-bog* (for so a tract of land covered with this grass is called)

becomes often a labyrinth, and sometimes a dangerous one to the visitor; for these spots are the resort of sea-lions, which, when incautiously disturbed, bite very severely. Both the *Tussock-grass* and *Balsam-bog* are found in Tierra del Fuego; but in the Falkland Islands they are most abundant and luxuriant. The latter plant, commencing as a little herb, and densely tufted like a *saxifrage*, by gradually and repeatedly branching, and these branches being covered with leaves, and radiating on every side, and all growing to the same length, forms a ball. When still larger, it assumes the form of a hemispherical cushion, rising out of the ground, of a pale yellow-green colour, and very firm substance: the little branches being so densely and uniformly packed together that they present an even surface, of such hardness and compactness that the knuckles may be broken against the mass. These hummocks of living vegetable matter often attain a height of four feet, and an equal or much greater diameter. They are called *Balsam-bogs*, from their fragrant and resinous smell; or, sometimes *misery-balls*, because they generally indicate a barren soil. The plant belongs to the same natural order as the carrot (*Umbelliferæ*): the flowers are similarly produced in little umbels: its striking difference in habit from the northern species of that order, is a character which it shares with some other antarctic plants: they constitute together a group of the *Umbelliferæ*, almost peculiar to the higher latitudes 1842.

1842. of the southern hemisphere, or the Andes of South America.

"Neither of the two remarkable species of *beech*, nor the *Winter's bark*, the *Fuchsia*, *currant*, or *barberries*, which inhabit Fuegia, are seen in the Falklands. The *Veronica elliptica* (*V. decussata* of our gardens) is the only large shrub of the islands, and it is confined to a few bays on the southern and western coasts. A white-flowered *Aster*-like plant, about four feet high, constitutes the most common shrub of the country; while the little *Empetrum rubrum*, a species of crowberry, producing a berry very similar to that of its northern congener, and further useful from the facility with which it ignites, even when sodden with rain, covers extensive tracts like heather. A small *myrtle*, bearing however no resemblance to its classic congener of Italy, creeps over the ground, and produces a sweet and pleasant berry; and a *Rubus* or *bramble*, analogous to our *R. arcticus* and *R. saxatilis*, but of humbler growth, nestles among the *Empetrum*, and affords a fruit equal in size and flavour to the raspberry. All these are Fuegian plants, but they are far more abundant in the Falklands. During early spring the banks near the sea are enamelled with a few highly beautiful and conspicuous flowers, such as are chiefly common to Patagonia: they are *Oxalis enneaphylla*, a wood-sorrel, with blossoms larger than those of the snow-drop; a curious little *Calceolaria*, bearing a single large flower; a yellow *violet*; and a *Sisy-*

rinchium, which, with the common European *Cerastium arvense*, whiten the clay-slate banks that skirt the shores of Berkeley Sound. The heaths and grassy lands are spotted, at the same season, with a white primrose, nearly identical with our *Primula farinosa:* there also grows the above-mentioned *Sisyrinchium*, of which the nodding white blossoms recall the snow-flake; and a plant, which resembles dandelion, but has white and pleasantly scented flowers, smelling like benzoin, is also abundant. 1842.

"Nowhere in the world are *Lichens* more conspicuous than in the Falklands. The beautiful *Usnea melaxantha*, also a native of the arctic regions, forms a miniature shrubbery on the tops of naked rocks on the hills; while their sides are coated with many species, almost invariably identical with those of Great Britain. Along the sea beach grow many species of this group, especially a pendent *Ramalina*, very near the *R. scopulorum* of Europe, and attaining a length of eight inches: it hangs so copiously from the rocks as in many places to cover them entirely.

"*Sea-weeds* abound prodigiously on the outer rocky coasts, nor did we elsewhere see such enormous masses of marine vegetation as were cast upon the beach of the east shore of the Falklands. They consist principally of *Macrocystis pyrifera*, mentioned as a native of Kerguelen's Land, *Lessoniæ*, and *D'Urvillæa utilis*. Wrenched from their attachment to the rocks and washed ashore, these sea-

1842. weeds become twisted together by rolling in the heavy surf, till they form enormous vegetable cables, much thicker than the human body, and several hundred feet in length. In some parts, the beach is so cumbered with these masses that walking becomes quite laborious; the pedestrian sinks frequently to the knees in the decaying heaps, and animal substance being also caught up, as in a net, the traveller's progress is rendered both offensive and tedious. Many most rare and beautiful sea-weeds may be detected here, either torn from inaccessible rocks far out to sea with the larger kinds, or growing parasitically upon them. The green, pink, and purple *lavers* of Great Britain may be readily recognised: though many of them are not found in the intervening warm latitudes, they re-appear in the cold seas of the opposite hemisphere; together with others, not exactly the same species, but representatives, in the southern ocean, of those sea-weeds which inhabit the northern. They remind the botanist of home, while they tell him he is not there. One gigantic genus is particularly abundant in the seas near the Falklands and Cape Horn, and surpasses all others in bulk. It is called *Lessonia* (after the naturalist of Captain Duperrey's expedition), and altogether resembles a tree in its mode of growth. The stem or trunk attaches itself by clasping fibres to the rocks, always beyond high-water mark: it attains a height of eight or ten feet and the thickness of a man's thigh: it branches upwards; and the ends of the

branches give out leaves two or three feet long, 1842. and barely three inches broad, which, when in the water, hang down like the boughs of a willow. In many places the plant is so copious that it forms a submerged forest. On looking down from a boat through the transparent water where it grows, nothing but a mass of green foliage can be seen. There are several different species of this sea-weed, all attaining great size. The stems, when washed on shore, bear such an exact resemblance to dead wood as quite to deceive the eye: no arguments of mine could dissuade the captain of a merchant brig, with whom I visited a portion of the Falkland Islands, from taking several boat-loads on board his vessel: he was perfectly convinced that this sea-weed would afford, when dried, excellent fuel. A better use is made of it by the Guachos, who shape pieces of the stem into knife-handles; when moist they drive the base of the blade into it, and leaving it to dry, it becomes harder than horn, and no force can sever the instrument from this novel kind of haft. A similar use is made of the large *Algæ* of Orkney. Though this gigantic and exuberant marine vegetable has hitherto been of little service to man, yet it performs a vast part in the economy of the lower orders of the animal kingdom. No person, who has not actually seen it, can form an idea of the amount of life which is nourished and housed by one of these tree seaweeds. Among the fibres of its clasping roots dwell various kinds of worms, small sponges,

1842. corals, crabs, and *crustaceæ* of different sorts. The stem is incrusted with corals and *Flustræ*, and often affords a point of attachment for the eggs of fish and *molluscæ*, besides being adorned with a growth of lesser *algæ*, as mosses cling to the trunks of forest-trees. The leaves are often white from the myriads of *Serpulæ* and other shells, and they harbour various predacious fish, besides yielding a place of retreat to the weaker species.

"The *Mosses* of the Falklands hardly merit notice, being very few in number, compared with what other Antarctic islands produce. The common *Sphagnum*, or *bog-moss* of Europe, is seen; but not so abundantly as the prevalence of peat and bog-earth might seem to infer: nor does it prove the same active agent in producing this kind of soil which it is in Scotland and Ireland. The numerous *grasses*, the *Empetrum*, the little *myrtle*, and some other flowering plants, take a greater share than *Sphagnum* in the formation of peat in the Falklands; and the soil so composed is perhaps of an equally antiseptic nature as that in the northern regions; for the leaves of some plants may be found uninjured in it at a considerable depth.

"The *Ferns* consist of very few species, though two of them, *Lomaria alpina* and *L. Magellanica*, both Fuegian plants, abound. The former is of small size, but often covers a considerable surface: the latter grows among rocks, and is subarborescent, its caudex forming a short stout stem,

from the apex of which numerous fronds spread on all sides: it is generally seen in stony places, and has much the aspect of a miniature *Zamia*. 1842.

"Hardly any of the Falkland Island plants are esculent: those which are so have valuable anti-scorbutic qualities; particularly the common *celery*, which abounds on the shores, also a species of *Cardamine* and *Oxalis enneaphylla*. Both the latter are called *scurvy-grass*, and would doubtless prove beneficial in cases of that disease. The lower part of the culm in the *tussock* is so fleshy and juicy, that, when a tuft of leaves is drawn out from a *tussock-bog*, an inch of the base, about the thickness of a finger, affords a very sweet morsel, with a flavour like nuts. Two men subsisted almost entirely upon this substance for fourteen months. They had wandered or deserted from their ship upon the West Falkland Island, where there are no habitations. The only protection from the weather that they could avail themselves of, was a hut made of the bogs or masses formed by tufted roots of this plant heaped upon one another: one of which was rolled to the opening at night, and served for a door. The berries of the *Empetrum* and *Myrtus* are edible, though ordinary; but the fruit of the *Rubus* equals a raspberry in size and flavour.

"Some European plants, long ago introduced by persons who have touched on these shores, are now scattered, through the agency of the cattle and horses, all over the eastern islands. I allude

1842. particularly to *Veronica serpyllifolia*, *Poa annua*, *Senecio vulgaris*, *Cerastium viscosum*, and *Stellaria media*.

"The peculiar mode of growth of the Tussock-grass (*Dactylis cæspitosa*) enables it to thrive in pure sand, and near the sea, where it has the benefit of an atmosphere loaded with moisture, of soil enriched by decaying sea-weeds, of manure, which is composed in the Falkland Islands of an abundant supply of animal matter, in the form of guano, and of the excrements of numerous birds, who deposit their eggs, rear their young, and find a habitation amongst the groves of Tussock. Its general locality is on the edges of those peat bogs which approach the shore, where it contributes considerably to the formation of peat. Though not universal along the coast of these islands, the quantity is still prodigious, for it is always a gregarious grass, extending in patches sometimes for nearly a mile, but seldom seen, except within the influence of the sea air. This predilection for the ocean does not arise from an incapacity to grow and thrive except close to the salt water, but because other plants not suited to the sea shore already cover the ground in more inland localities, and prevail over it. I have seen the Tussock on inaccessible cliffs in the interior, having been brought there by the birds, and afterwards manured by them; and, when cultivated, it thrives, both in the Falklands and in England, far from the sea.

"I know of no grass likely to yield nearly so great

an amount of nourishment as the Tussock, when thoroughly established; in proof of which I quote Lieutenant Governor Moody's printed report, for the truth of which I can vouch, both from my own experience, and from his having kindly given me ample means for judging of the correctness of his interesting and useful observations. 1842.

"During several long rides into the country, I have always found the Tussock flourishing most vigorously in spots exposed to the sea, and on soil unfit for any other plant, *viz.* the rankest peat bog, black or red. It is wonderful to observe the beaten footpaths of the wild cattle and horses, marked like a foot-track across fields in England, extending for miles over barren moor land, but always terminating in some point or peninsula covered with this favourite fodder, amid which one is almost certain to meet with solitary old bulls, or perhaps a herd of cattle; very likely, a troop of wild horses, just trotting off as they scent the coming stranger from afar. To cultivate the Tussock-grass, I should recommend that its seed be sown in patches, just below the surface of the earth, and at distances of about two feet apart; it must afterwards be weeded out, for it grows very luxuriantly, frequently attaining a height of six or seven feet. It should not be grazed, but cut or reaped in bundles. If cut, it quickly shoots again, but is much injured by grazing; for all animals, especially pigs, tear it up, to get at the sweet nutty-flavoured roots. I have not tried how it

1842. would be relished if made into hay, but cattle will eat the dry thatch off the roof of a house in winter; their preference to Tussock-grass being so great, that they scent it a considerable distance, and use every effort to get at it. Some bundles, which had been stacked in the yard at the back of Government House, were quickly detected, and the cattle in the village made, every night, repeated attempts to reach them."

"Since the above was written, the Tussock has been used abundantly when made into hay, being preferred by cattle even to the green state of any of the other excellent grasses in the Falklands. Governor Moody informs me that in his garden it grows rapidly, and improves by cutting. There is, however, one drawback to the value of the Tussock: it is a perennial grass of slow growth, and some disappointment has already been experienced in England from this cause. Each Tussock consists of many hundreds of culms, springing together from a mass of roots, which have required a long series of years to attain their great and productive size. Our cultivated specimens in the Royal Gardens of Kew, now nearly three years old, are in a fair way of becoming good Tussocks; for the quantity of stems from each root, the produce of one seed, is incalculably more than any other grass throws up, and these are already forming a ball of root-fibres, which in time will form a mound. But this ball, now scarcely six inches across, and not two in height, must have grown to six or eight

feet high, with a diameter of three or four feet; 1842.
instead of forty culms, there must be four hundred; and the leaves, now three feet long, must attain seven, ere the Tussock of England can compete with its parent in the Falklands. Though, however, the stoles (if I may so call the matted roots of this grass) in the most vigorous native specimens attain a height of seven feet, it is certain they are very productive before they have reached two or three. By the time the leaves have gained their great size, the bases of the culms are nearly as broad as the thumb, and, when pulled out young, they yield an inch or two of a soft, white, and sweet substance, of the flavour of a nut, and so nutritious that two American sealers, who deserted a vessel in an unfrequented part of the Falklands, subsisted on little else for fourteen months.

"Again, the Tussock-grass field, when fully established, must not be grazed indiscriminately by cattle. These creatures and the pigs have already diminished its abundance in the Falklands; for, after devouring the foliage, they eat down the stumps of the culms, greedily following them into the heart of the mass of roots from which they spring, for the sake of the white core just described; the rain-water lodges in the cavity thus formed, and decay so surely follows, that I have seen nearly half a mile of Tussock-grass plants entirely destroyed by no other means.

1842. "Although in the Falklands this plant will grow on the fine sand near the sea, and there reach as great a size as on any other soil, it is not likely to do so in the drier climate of Britain, where the absence of an equally humid atmosphere must be artificially remedied. A wet, light, peaty soil has, in England, been found to favour its growth; sea-weed manure might probably be added with advantage, and certainly guano. Slow its progress assuredly is, but it may be hastened by such stimulants. In the meantime, the cultivator has no just cause for complaint; the plant is already increasing unusually at the base, and thence sending up many more culms than any other grass, though, springing from one small base, they do not make such a show, but form a compact mass of living roots, which, in the case of other gramineæ, would spread over ten times the area that this occupies, and they annually increase in vigour and productiveness; and, lastly, it must be borne in mind, that the farmer here obtains an enormous crop from a very small surface. Each great Tussock is the produce of one seed, and is an isolated individual plant, which, though standing perhaps upon only two square yards of ground, yields annually a produce equal to that of a much greater surface of land, if cropped with hay or clover. The number of seeds required to stock an acre in Tussock and one in grass, is in the proportion of tens to thousands; and we may be well content to know, that the

number of months required to ensure a profitable return is not in the same ratio. 1842.

"There are few plants which, from perfect obscurity, have become objects of such interest as this grass. The Tussock in its native state seems of almost no service in the animal economy. A little insect, and only one that I observed, depends on it for sustenance; and a bird, no bigger than a sparrow, robs it of its seeds; a few sea-fowl build amongst the shelter of its leaves; penguins and petrels seek hiding-places amongst the roots, because these are soft and easily penetrated; and sea-lions cower beneath its luxuriant foliage: still, except the insect, I know no animal or plant whose extinction could follow the absence of this, the largest vegetable production in the Falklands, which does not support even a parasitical fungus. These same sea birds breed and burrow where no Tussock grows; rocks, elsewhere, suit the sea-lion's habits equally well; and the sparrow, which subsists on other food eleven months of the year, could surely make shift without this for a twelfth. Certain it is, that the Tussock might yet be unknown and unprized amongst plants, if cattle had not been introduced into its locality by man; who thus became, first the injurer, and then the protector and propagator of the existence of this noble grass: for the herbaceous quadrupeds which he carried to the Falklands, and left there, were surely extirpating the Tussock, when man returned, and, by

1842. protecting, perpetuating, and transporting it to other countries, he has widely dispersed it. It appears singular that so striking a grass should abound where there is no native herbaceous animal to profit by its luxuriance: but it is no less certain that, had not civilisation interfered, the Tussock might have waved its green leaves undisturbed over the waters of the stormy Antarctic ocean, for ever perhaps, or until some fish, fowl, or seal, should be so far tempted by the luxuriance of the foliage, as to transgress the laws of nature, and adapt its organs to the digestion and enjoyment of this long-neglected gift of a bounteous Providence.

"It must appear strange to all who know grasses only in the pastures of England, that the patches of Tussock resemble nothing so much as groves of small, low palm trees! This similarity arises from the matted roots of the individual plants springing in cylindrical masses, always separated down to the very base, and throwing out a waving head of foliage from each summit. Bogs and damp woods in Britain very frequently produce a sedge (*carex paniculata*), whose mode of growth is, on a small scale, identical with that of the Tussock-grass, and to which the name of Tussock is applied. I have seen them two or three feet above the ground in South Wales; and if they were higher, larger, and placed close together, the general resemblance would be complete. The effect in walking through a large Tussock grove is very singular, from the

uniformity in height of these masses, and the nar- 1842.
row spaces left between them, which form an effectual labyrinth — leaves and sky are all that can be seen overhead, and these curious boles of roots and decayed vegetable matter on both sides, before and behind, except now and then, where a penguin peeps forth from his hole, or the traveller stumbles over a huge sea-lion, stretched along the ground, blocking up his path."

Mount Kater, Hermite Island. Page 287.

CHAPTER X.

Sail from Port Louis. — Bank discovered. — Depression of Temperature. — Cape Horn. — Anchor in St. Martin's Cove. — Natives of Hermite Island. — Its Botanical Productions. — Trees. — Alpine Plants. — Flowering Plants. — Plants common to Britain. — Mosses and Esculent Plants.

CHAPTER X.

THE term-day observations and absolute determinations were completed by the 4th of September, and being desirous to obtain a series of experiments in the vicinity of Cape Horn, strictly comparative with those arranged to be made at Port Louis in our absence, and similar to those we had made during the preceding winters, in situations favourable for comparison with the Van Diemen's Land observatory, preparations were made for the departure of the ships. 1842. Sept.

Before leaving Port Louis, however, I must notice some changes that became necessary, consequent upon the loss we were about to sustain in the services of the senior lieutenant of the Terror. Mr. M^cMurdo, who had distinguished himself by his zeal, activity, and skill on all occasions, had, during the whole period of our voyage, suffered frequently from a constitutional malady, which had now become so greatly aggravated by the arduous duties of his position, in a climate admitting of no repose, that the medical officers of the Expedition concurred, in their report to me, that it was essential, not only for the restoration of his health, but for the preservation of his life, that he should not again encounter the severities of an Antarctic navigation,

1842. but, as immediately as possible, return to a milder climate. As some opportunity might occur of his returning to England during the absence of the ships from Port Louis, it was considered desirable that he should not accompany us to Cape Horn. In his place Mr Sibbald was appointed senior lieutenant of the Terror; Mr. Oakeley, the senior mate, to act as lieutenant in the vacancy: and by the removal of Lieutenant Sibbald, Mr. Wood became senior lieutenant of the Erebus.

The magnetic observatory was placed in the charge of Lieutenant Sibbald, with a sufficient number of assistants to carry on a system of observations during our absence, upon such a plan as to secure a satisfactory record of the magnetic phenomena at the two places, distant from each other about 400 miles.

Sept. 8. These, and all other arrangements, being completed, we sailed, on the morning of the 8th of September, with a fresh breeze from the westward, and by noon were abreast of Bird Island, where we met a heavy swell from the eastward, the effect of the late storms from that quarter.

The wind veered to the south-west as we approached the entrance of the sound, and freshened in heavy squalls as we crossed the opening of Port William. The harbour appears contracted from this point of view, but there is sufficient space for as many vessels as are ever likely at any one time to anchor there.

After passing close to the Seal Rocks and round-

ing Cape Pembroke, we hauled close to the wind under moderate sail during the night. 1842.

A storm came on soon after noon the next day, from the south-west, which continued with little intermission, and accompanied by snow and rain, but varying in direction between south and west. As we might have expected in such a tempestuous ocean, and at a period of the year corresponding with the boisterous month of March in our latitudes, we encountered during our passage from the Falkland Islands to Cape Horn very severe weather, the gales usually commencing in the south-west, veering to the west, and generally, as in the North Atlantic Ocean, ending in the north-west. Sept. 9.

The birds met with in the greatest numbers were the Cape pigeon, grey petrel, sooty and black backed albatross, gigantic petrel, some penguins and a few tern; extensive patches of the two more common kinds of sea-weed were also frequently seen.

On the 16th, in latitude 54° 41′ S., and longitude 55° 12′ W., we obtained soundings in two hundred and eighty fathoms, on a bank of coarse black sand and small stones of volcanic origin; the shallowness of the water accounting for the short breaking which has always been remarked near this spot by former navigators, and was experienced by ourselves to our great discomfort. We were at this time distant above three hundred miles from Staten Island, and from Beauchêne Island, the Sept. 16.

1842. nearest land, about two hundred miles. The temperature of the sea at two hundred and eighty, and one hundred and fifty fathoms, was 39°·8, and at the surface 39°·5. The specific gravity of water taken from those depths, and at the surface, was 1·0277 at 41°.

Sept. 18. South-easterly winds with more moderate weather prevailed between the 16th and 18th; so that by noon of that day we were in latitude 55° 40′ S., and longitude 63° 8′ W., having approached within fifty miles of Staten Island, and one hundred and forty of Cape Horn, yet we had no soundings with three hundred fathoms, and the temperature at that depth was found to be 37°·2, the surface being 40°·2. There appears to me no other way of accounting for this extraordinary depression of temperature, except by a current of water from the colder regions of the south running along the east shore of Tierra del Fuego, similar to that which I have already described as running from the Cape of Good Hope along the western coast of Africa*, or possibly the proximity of a snow-covered land might be the cause of the sea being so much below the temperature due to that depth; for in the same latitude, and only two hundred and fifty miles to the eastward, when beyond the baneful influence of the land, we found the mean temperature of 39·5° throughout the whole depth of our experiment, to one thousand fathoms.

* Vol. I. p. 34.

At eight o'clock the next morning the snow-clad summits of the hills, whose southern termination forms Cape Deceit, were seen bearing W.S.W. by compass, and at noon Cape Horn was observed, S. 62° W., distant between six and seven leagues. 1842. Sept. 19.

The poetical descriptions that former navigators have given of this celebrated and dreaded promontory, occasioned us to feel a degree of disappointment when we first saw it; for, although it stands prominently forward, a bold, almost perpendicular headland, in whose outline it requires but little imaginative power to detect the resemblance of a "sleeping lion, facing and braving the southern tempests," yet it is part only of a small island, and its elevation, not exceeding five or six hundred feet, conveys to the mind nothing of grandeur. But the day was beautifully fine, so that it is probable we saw this cape of terror and tempests under some disadvantage. We passed it at 3 P.M., at the distance of about a mile and a half, which was as near as we could approach it with prudence, by reason of the dangerous rocks which lie off to the east and west, and whose black points were rendered conspicuous by the white foam of the breakers, amongst which numerous seals were sporting. There was some snow on the summit of the cape, and its sides were clothed with a brownish coloured vegetation; beyond it, the shores of the island consisted of black vertical cliffs, with a curiously cleft rock at its north-western extreme.

1842. As we stood across the Bay of St. Francis, we were struck with the wildness and beauty of the scenery, its numerous islands and lofty peaks, more particularly those of Hermite Island, whose southern extreme forms the bold perpendicular promontory called Cape Spencer. We beat up to the entrance of St. Martin's Cove, but just after sunset, when we were running into it, the wind suddenly shifted and compelled us to anchor in a very exposed position, in seventeen fathoms, on fine sand and black stones, but not very good holding ground.

I despatched Mr. Tucker up the cove to examine the nature of the harbour, a clear moonlight night facilitating his operations. He soon returned with a favourable account of the anchorage, and reported having seen a fire at the head of the cove, indicative of the presence of natives, whom he judiciously left undisturbed.

Sept. 20. As soon as day broke Captain Crozier and I went to make a further examination of the harbour; when near the end of the inlet we saw a canoe and three men standing near it; one of them approached us unarmed, and without the least appearance of fear, pointing out the most convenient spot for us to land, for the surf was heavy on the beach, and continually calling out "Yamma Coyna," words which have been differently interpreted by Captain Fitzroy and Mr. Darwin. I am fully persuaded the former is right in considering them to be an expression of welcome, for the man

could hardly be calling to us to give him any thing, when we were so distant from him that his voice was at times scarcely audible; nor when we landed did they hold out their hands, as if in expectation of receiving any present from us. They were perfectly naked, with the exception of a small otter skin thrown over their shoulders, which greatly surprised us, for the ground was still thinly covered with snow. Their women and children they had probably sent out of the way when they saw us approaching; and there was not an article of any kind to be seen in their miserable "wigwam." We stayed a short time with them to establish a friendly confidence, and at parting they again shouted to us "Yamma Coyna," which we adopted as a symbol of friendship. They embarked in their canoe soon after we left the shore; and as they pulled out of the cove, close past our ships, they shouted the same words, continuing to do so as long as they could be heard, when at nearly a mile from us, and paddling away as fast as they were able, anticipating the approaching "williwaws," or violent gusts of wind, which followed in the evening, and which they had predicted to us by signs that could not be misunderstood.

1842.
Sept. 20.

The cove appearing to be sufficiently sheltered for our purpose, we made the signal for the ships to enter, and by the time we got on board they were under-weigh. A gentle breeze blew directly out of the harbour, so light that our heavy ships would have scarcely felt its influence, so that we

1842. were obliged to have recourse to the tedious operation of warping up to the anchorage, and before this could be done, we had sharp squalls from the hills, which greatly impeded us, and rendered the work far more laborious; so that it was not until long after dark that both ships were moored in the places selected for them. The small bower of the Erebus being near the south shore, in twelve fathoms and a half, on fine sand, mud, and shells, and the best bower on the north shore, in ten fathoms, with seventy-two fathoms of cable on each, which stretched nearly across the cove at its head: the south point of the inlet bearing N. 80° E., the north point N. 55° E.; the north end of Chanticleer Island N. 74° E., and Foster's Peak, on the south shore, S. 17° E.

Sept. 21. We were sorry not to be ready to co-operate with the numerous observatories which would be this day engaged making simultaneous magnetic observations, it being one of the appointed term-days; but, although I had landed in the morning, and chosen a site for our magnetic observatory, much time and labour would be required to clear away the trees and underwood which encumbered the ground; and it was therefore impossible even to put up our observatories, or land the instruments until that was accomplished. The loss of this day's observations for our especial object was, however, of less consequence, as I had fortunately arranged with the party of observers left at the Falkland Islands, to hold an additional term-day, on the 4th

of October, for which we had abundance of time to prepare. 1842. Sept.

A large party from each ship, under the immediate direction of Captain Crozier, laboured hard for several days, clearing the only spot of level ground of sufficient extent for our purpose: this proved to be a swamp, and, after digging through the upper crust, of about two feet in thickness, they found a liquid bog, six feet in depth: beneath this, was a stiff clay, and, at length, by driving numerous piles into it, and placing casks filled with sand upon them, a firm foundation was made. It was still necessary completely to isolate these supports of the instruments from the upper crust of the bog, by digging a deep ditch round the building, which effectually prevented the vibration of the swamp, and the tremulous motion of the magnets, which the footsteps of any one approaching the observatory had previously produced. The regular series of magnetometric observations was commenced on the 29th of September. Sept. 29.

The shores of St. Martin's Cove are composed of a very compact greenstone and hornblende rock, rising abruptly from the sea to an elevation of about twelve hundred feet; above these are some rugged peaks, which attain nearly two thousand feet. The hills surrounding the harbour form an amphitheatre, and their sides, to about a thousand feet, are clothed with the evergreen and deciduous beech, so densely interwoven that it is almost im-

1842. possible to penetrate them, except by the well-beaten footpaths of the Fuegians. The mountain peaks are of very compact greenstone, and highly magnetic, possessing the property of polarity in an extraordinary degree, the poles of the fragments broken away from the mass lying always in the line of the dipping needle, the whole forming a magnet of enormous magnitude, but not of sufficient power to produce any anomalous expressions from the instruments we employed; although, in one spot, we found the dipping needle gave an erroneous result of nearly half a degree.

The geological structure of Hermite Island, which Mr. M'Cormick examined with great diligence, is described in the Appendix; and the botanical account by Dr. Hooker, which possesses an unusual degree of interest, is inserted here.

"The scenery of Hermite Island so closely resembles that of many parts of the West of Scotland, that the two countries seem only to differ in the species of animals and plants which respectively characterise the northern and southern hemispheres. There are the same narrow arms of the sea, confined by high mountains, in Hermite Island, as form the salt-water lochs of Argyleshire; with similar deep and close bays, hemmed in by rocky, precipitous, and often inaccessible shores. The mountains rise at once from the water's edge, clothed for half their elevation with a low green forest, and crowned with rugged precipices and grey masses of rock; while torrents, heard,

rather than seen, till they emerge in foaming cascades, occupy every gully. In Fuegia these wild scenes are rendered gloomy, and, to the traveller who has recently quitted a more genial climate, positively forbidding, by the almost total absence of animated nature, and by the clouded sky, constant storms, and vexed ocean, added to the silence which is only broken by the hollow voice of the torrent and the cry of the savage. 1842.

"The various sea-weeds that abound in the Scottish lochs are represented in Fuegia by an infinitely more luxuriant growth of the same species as were mentioned to be natives of the Falkland Islands and Kerguelen Island. Though very different from our northern *Algæ*, they are equally, and some of them even better, adapted for making kelp. The rocks immediately above the sea are generally barren, or only covered with *Lichens;* but sometimes they produce a few green tufted plants; and wherever there is any beach, it yields several kinds of *scurvy-grass* (*Cardamine hirsuta*), the *wild celery* (*Apium graveolens*), besides a *Plantago*, *Chrysosplenium*, and some other herbs in considerable abundance.

"From the shore to an elevation of eight hundred feet, the steep sides of the hills, except where absolute precipices intervene, are clad with an uniformly lurid though deep green forest, consisting entirely of the following trees:—the *evergreen beech* (*Fagus Forsteri*), that never sheds its shining coriaceous foliage—this is the most prevalent tree;

1842. the *deciduous beech* (*Fagus Antarctica*), of which the leaves fall at the approach of winter, after assuming the same tints, heightened by comparison with its evergreen neighbour, as characterise our English beech: its leaves are broader, of a thinner texture, paler and brighter green, and beautifully plaited. In the late spring of these antarctic regions, when any part of a day was occasionally warm and clear, the bursting of the young folded leaves of the *deciduous beech*, from the sheathing and gummy scales by which they had been protected during winter, was to us, who had seen no kind of tree for twelve months, nor any such sign of an English spring for upwards of thrice that period, a most agreeable phenomenon; rendered still more delightful by the resinous scent with which the woods were filled. Mingled with these beeches grow scattered trees of the *Winter's bark* (*Drimys Winteri*), so named after the discoverer, John Winter, the companion of Drake. The tree is tall and straight, with large glossy leaves, paler underneath. Every part is highly aromatic and warm to the taste; and the cortex affords the medicinal *Winter's bark* of commerce.

"The three trees, above described, occupy exactly the same position in Fuegia which the birch, oak, and mountain ash do in Scotland.

"There is a remarkable absence of undergrowth in the forests: few shrubs, and hardly any herbaceous plants appear. Among the former is the beautiful *holly-leaved barberry*, which, except the

Veronica elliptica (*V. decussata* of our gardens), is the only very handsome-flowered plant in this part of Fuegia. Two or three other woody plants, a second species of *barberry*, an *Arbutus* and an *Escallonia* (the latter allied to the saxifrages of the northern hemisphere), almost conclude the list of shrubs. The banks and rocks that border the torrents exhibit a few *Ferns* and a luxuriant growth of *Mosses*. These abound throughout Hermite Island, covering the rocks, moors, and trunks of trees, and thriving in the gullies formed by the streams, where there is not light enough to permit the vegetation of flowering plants. Both in the number of individuals, and the extent of ground here occupied by the respective kinds, the preponderance of Lichens and Mosses is truly remarkable. 1842.

"Ascending, the forest gradually becomes denser and more stunted, till it is rendered quite impervious by the trees branching from the very ground. At the season of our visit, traces of last winter's snow were seen at the upper limit of the forest: the surface was hard, but often treacherous, because concealing torrents which had gradually undermined their icy bridges. When such hollows are exposed, it is curious to observe the *Arbutus* covered with flowers, which ought to have expanded the previous year, but which had been retarded and protected by a mantle of snow. Yet a little higher, and the dwarfish trees dwindle to what resembles a basket-work of growing twigs. So densely interwoven is the living mass, which

1842. reaches to the knee or higher, that to crawl through a few yards of this vegetation is a task accompanied with more fatigue, pain, and tardiness of progress than the traveller suffers when traversing loose sand, earth scorched by the sun, or deep snow. No amount of force can tear a way: fishermen's boots alone afford protection against the spiny branches, which threaten to stake the pedestrian, as he sinks, at each step, among the boughs. Here, the length of limb, that proved an inconvenience when crawling among the low trees, becomes very advantageous. On approaching the utmost limit of the forest, the matting grows more and more impervious; and it seems hopeless to attempt proceeding. But suddenly a facility is afforded: the trees, which lower down were of a girth of fifteen feet, grow so closely at this elevation, that the traveller, instead of walking under their shade, can tread upon their topmost branches.

"Above this, the wood gradually opens out into a moorland tract, remarkable for the absence of *Grasses* and the abundance of *Lichens*. Here and there a mountain tarn diversifies the surface: deep, black, quiet pools fill the depressions; their surface presenting no water-herb, and only a few submerged Mosses and *Confervæ* at the bottom. Though this region is barren to the eye, it is rich in alpine plants, which are all of a tufted and mossy habit. A few, as *Caltha*, *Astelia*, *Forstera*, and *Donatia*, form broad bright green patches; but the majority are of a greyer hue. The *Empetrum*, in-

digenous to the Falklands, grows here, though not 1842.
abundantly. Like its Scottish congener, it is the favourite food of a species of grouse. Small shrubs, chiefly of *Arbutus*, or an *Aster*-like *Composita*, with white flowers, diversify the ground; but the vegetation consists mainly of species belonging to the European genera *Caltha*, *Gentiana*, *Pinguicula*, *Primula*, *Saxifraga*, *Senecio*, *Juncus*, *Carex*, *Viola*, *Oxalis*, and various grasses. In moist places, *Sphagnum*, or *bog-moss*, is very common, with many of the allied kinds of moss which compose peat in the alpine districts of Europe.

"The mountain-tops are very bare; affording only *Mosses* and *Lichens*, which cling with astonishing pertinacity to the rugged faces of the sharp peaks and piles of rock. On the south and south-western sides of these weather-beaten precipices that handsomest of all Lichens (*Usnea melaxantha*) braves the perennial blasts and snow-storms of the Antarctic Ocean; spreading out its slender bright sulphur-coloured branches, which seem as if expressly formed of a rigid leathery substance, so stiff as to resist the force of the elements. In the clefts of the very pinnacles of the mountains a few plants may still be detected, which have crept upward from regions more congenial to their development.

"As Hermite Island is situated close to Cape Horn, and there are no flowering plants to be found in any higher southern latitude, a list* is

* Only four species of flowering plants reach the top of Mount Kater, a peak of greenstone, 1700 feet above the sea, and the

1842. appended of the indigenous species which grow in this parallel, and at a height of upwards of 1500 feet. Like the degraded and savage native, who wanders naked among the bleak rocks and almost equally uninviting woods of this miserable land, these plants may be justly considered the hardiest of their race in the southern hemisphere.

"In the preceding remarks I have attempted to sketch the general aspect of vegetation in a landscape strikingly analogous to the Western Highlands of Scotland. Persons, intimate with the latter country, have only to clothe it in imagination with the plants of Hermite Island, and they will readily understand the relations, in habit and station, which the most remarkable of these bear to one another. The Fuegian Flora possesses some other points of interest, especially when viewed in comparison with that of the antarctic islands lying to

culminant point of the island. They are: — UMBELLIFERÆ: *Azorella Selago* (also found in Kerguelen Island). — COMPOS.: *Abrotanella emarginata* (a Falkland Island plant).— ERICEÆ: *Pernettya pumila* (frequent from Central Chili to Cape Horn). — EMPETREÆ: *Empetrum rubrum* (very near the *E. nigrum* of N. Europe, and also frequent from Central Chili to Cape Horn). The following eleven species reach an elevation of 1500 feet on greenstone; either on Kater's peak, Mount Foster, or another peak which was examined: *Viola tridentata, Saxifraga bicuspidata, Escallonia serrata* (starved, a plant allied to *Saxifraga*), *Azorella lycopodioides, Ourisia breviflora* (allied to *Veronica*), *Drapetes muscosa* (a genus of *Daphneæ*), *Fagus Antarctica* (the deciduous beech, prostrate and only three inches long) *Luzula, sp.?* (a species allied to the Arctic *L. arcuata*); three grasses, *Triodia Antarctica, Aira parvula*, and *Festuca erecta*.

the south of New Zealand, also with that of the 1842.
Falklands, South Georgia, Tristan d'Acunha, and Kerguelen Island. All these countries, though the latter is distant more than 5,000 miles, seem to have borrowed many plants from this, the great botanical centre of the Antarctic Ocean. And it is a still more surprising fact, that the vegetation of Fuegia includes a considerable number of English plants; though 106 degrees of ocean roll between, and some of the species in question inhabit no intermediate latitudes.

"Like Lord Auckland's and Campbell's Islands, Tierra del Fuego exhibits a luxuriance of vegetation which its rigorous climate and low annual temperature would not have led us to expect. The same cause effects this in both longitudes; namely, the absence of all sudden changes from heat to cold, and *vice versâ*. But though the individual species grow luxuriantly, they are by no means so beautiful as those of the before-mentioned islands, lying only three degrees farther north. Thus, the *Metrosideros*, a shrub allied to the *myrtle*, and the white-flowered *Dracophyllum*, are replaced in Fuegia by almost flowerless beeches. Instead of three shrubby *Veronicas*, there is but one, which is identical with the Auckland Island species, viz. *Veronica elliptica;* first described and so called by Forster, who gathered it in New Zealand; but introduced into England from Cape Horn, and generally known by the name of *V. decussata*.

1842. "Of the ninety-seven flowering plants indigenous to Auckland and Campbell Islands, about thirteen are common to the southern extremity of the American continent; but none, except the *Veronica*, is remarkable for beauty. The splendid *Chrysobactron Rossii* and lovely *Compositæ* of these groups have no representatives here. Fuegia, however, boasts some conspicuous plants: the *holly-leaved barberry* (*Berberis ilicifolia*) is very handsome; *Geum Chiloense* is an established favourite in our gardens; and a few of the smaller alpine species may vie in grace with those of the Scottish Alps. There is a want of bright tint in the landscape; or of any one conspicuous plant which may give it colouring. This is hardly compensated by Tierra del Fuego being the native place of that universal favourite, the scarlet *Fuchsia;* a plant of peculiarly graceful form, whose culture requires little care, and which is, perhaps, among the most valuable ornaments of our gardens, whether of the rich or poor. Though not seen on Hermite Island, the *Fuchsia* flourishes on the neighbouring coast of Fuegia, and adorns with its bright flowers the gloomy forest of the beech-tree; for both inhabit the valleys, choked by everlasting glaciers, which descend from the mountains to the sea, on the west coast of this inhospitable land. The *Fuchsia* and other plants, which might be considered tender for this region, flourish in the equable though chilly temperature maintained by the presence of these sluggish and perennial cataracts of ice on the

Fuegian mountains. The main difference between the Flora of Tierra del Fuego and of the islands south of New Zealand consists in the abundance of *Rubiaceæ* which mark the latter, and which are replaced in the region we are now considering by an increased proportion of *Compositæ*. 1842.

"When treating of the Falkland Islands and Kerguelen Island respectively, it was stated how much they are dependent on Fuegia for a large proportion of their plants; and an examination of the botany of South Georgia, farther east than the Falklands from Fuegia, and of Tristan d'Acunha, which, like Kerguelen Island, lies much nearer to the coast of Africa, also exhibits the same affinity. Strange and inexplicable though it may appear, it is still true that plants, found in these isolated specks alone, must have traversed (granting migration to be the cause of specific identity in distant spots) thousands of miles of the stormiest ocean of our globe. A glance at the chart shows the infinitely small proportion borne by these islets to the endless waste of waters wherein they are placed; and the prodigious obstacles that such objects as seeds must have surmounted in performing, with unimpaired vitality, these remote voyages, if we suppose their dispersion to have taken place subsequently to the land and water holding the relative position they at present maintain.

"The common observer and the scientific inquirer will alike find much singularity in the vegetation of Fuegia. It exhibits a larger proportion

1842. of plants, either identical with those of Britain, or representatives of them, than exists in any other country of the southern hemisphere. It is always interesting to meet with familiar objects where they are least expected, and to recognise, in the natural productions of a strange land, the same, or similar to those we have often seen elsewhere. Tierra del Fuego possesses, in common with Britain, the *sea-pink* or *thrift* (*Statice Armeria*); a *primrose*, so like our *Primula farinosa* that they are scarcely distinguishable; the common *star-wort* or *Callitriche*, *Montia fontana*, *Arenaria media*, *Erigeron alpinus*, *Gnaphalium luteo-album*, *Cardamine hirsuta*, and *Apium graveolens* (*celery*), which, though a rank weed when it grows wild in England, is so wholesome and mild in Fuegia, probably from the absence of the sun's direct rays, that it affords an excellent salad. There are also the *Hippuris vulgaris* (*mare's tail*), *Cerastium arvense*, *Sisymbrium Sophia*, *Lathyrus maritimus*, *Convolvulus sepium*, *Limosella aquatica*, *Epilobium tetragonum*, *Draba incana* (a highland plant), *Sagina procumbens*, *Galium Aparine* (*cleavers*), the common *Dandelion*, *Empetrum rubrum*, which differs in the colour of the berries only from the Scottish *crowberry*, *Plantago maritima*, *Chenopodium glaucum*, *Aira flexuosa*, *Phleum alpinum*, *Alopecurus alpinus*, *Agrostis alba*, *Poa nemoralis* and *pratensis*, *Festuca duriuscula*, *Triticum repens*, and *Lolium perenne*, all well-known inhabitants of our shores, meadows, mountains, or woods. The affinity between

the Fuegian and British Floras becomes more evident on looking to the common genera of the former country: they are, *Ranunculus*, *Caltha*, *Berberis*, *Cardamine*, *Draba*, *Arabis*, *Thlaspi*, *Silene*, *Lychnis*, *Stellaria*, *Cerastium*, *Oxalis*, *Viola*, *Geranium*, *Drosera*, *Rubus*, *Ribes*, *Potentilla* (*P. anserina* grows in South Chili), *Myriophyllum*, *Saxifraga*, *Chrysosplenium*, *Asperula*, *Galium*, *Valeriana*, *Senecio*, *Hieracium*, *Aster*, *Taraxacum*, *Gnaphalium*, *Arbutus*, *Gentiana*, *Myosotis*, *Pinguicula*, *Samolus*, *Scutellaria*, *Limosella*, *Stachys*, *Anagallis*, *Plantago*, *Chenopodium*, *Rumex*, *Polygonum*, *Empetrum*, *Fagus Urtica*, *Triglochin*, *Juncus* and *Luzula*, *Carex*, *Scirpus*, *Eleocharis*, *Isolepis*, *Schœnus*, and nineteen genera of Grasses. Many of the genera in this long list are unknown in the tropics. Others exist there only in species bearing little analogy to their congeners of the colder or temperate latitudes. As they are recognised on the shores or mountains of Fuegia, they perpetually draw the traveller's mind to that interesting subject—the diffusion of species over the surface of our earth. 1842.

"As we descend in the scale of vegetable creation, the number of plants common to the opposite hemisphere is seen to augment: the increase bearing an inverse proportion to their development. Thus, there are two kinds of *Ferns*; as many *Lycopodia*; a *Chara*; forty-eight species of *Mosses*; twelve *Hepaticæ*, and a very large amount of *Algæ*; while almost every Fuegian *Lichen* is not only an acknowledged but a prevalent species in Britain.

1842. "Fuegia is richer in *Mosses* than any other antarctic island: perhaps no part of the globe of equal extent yields more or finer species than Hermite Island. During the short stay of the Antarctic Expedition one hundred different kinds were found; and the naturalist, who is accustomed to collecting this tribe of plants, is well aware that a protracted search is needful in order to exhaust the Mosses of even a limited area. *Polytrichum dendroides*, the noblest of *Mosses*, forms a miniature forest in the woods. Seven species of *Andræa* occur; a genus which only four years before had been supposed peculiar to the northern hemisphere; but of which one kind has been since found at the Cape of Good Hope, the *A. subulata*, first detected by Dr. Harvey on Table Mountain, where it was also gathered by the officers of the Antarctic Expedition: others on Lord Auckland's group, Hermite Island, and Kerguelen Island; in Tasmania, and almost every antarctic island visited by the expedition; thus nearly trebling the number of species.

"There are very few esculent plants in Fuegia, and the natives use none of them except a *Fungus*, described by Mr. Darwin. They are, the *celery*, and a kind of *scurvy-grass*, also plentiful in the Falklands and Campbell's Island (*Cardamine hirsuta*). The fruits of a species of *Currant*, *Barberry*, *Crowberry*, *Myrtle*, and *Bramble* are eatable in tarts; the latter, indeed, is excellent, uncooked. The *Tussock-grass* is not so plentiful as on

the Falklands, though it grows, not unfrequently, on the outlying islands. *Winter's bark*, now little used in our country, proved of great value to the boats' crews, when detached from Captain King's surveying ship, the Beagle. The wood of *Berberis ilicifolia* is of a bright gamboge yellow, and affords a clear and strong dye of that colour. Some of the large *Sea-weeds* of the Fuegian shores have been analysed by Dr. R. D. Thomson, and found to yield abundance of manna, besides a much larger proportion of iodine than the *Algæ* of the northern hemisphere. 1842.

"This sketch of the botany of a country long and undeservedly considered the most inhospitable, if not the most barren, in the world, may be concluded by the remark, that, however credible in themselves are the reports of voyagers, they ought in fairness to be considered in connexion with the impressions to which the previous events of their several voyages are likely to have given rise. For instance, we, who had lately explored a more boisterous ocean, and had visited incomparably bleaker coasts, could find charms in the wild woodland scenery, secluded bays, precipitous mountains, and interesting vegetation of Tierra del Fuego, which even its gales and snow-storms were insufficient to dispel; for, terrible as the war of elements here is, we were in a measure sheltered from its fury. Far different was the aspect the country must have worn in the eyes of Cook, Banks, and Solander! They had recently quitted the magnificent bay of

1842. Rio de Janeiro, its fervid sun and glowing vegetation. Anson, again, with his reduced company, palsied by scurvy and other diseases, could have little dreamt of the snug harbours and abundance of antiscorbutic diet, which here offered both shelter to his shattered vessels, and the means of recruiting the health of his crew. The naturalist who first visited the Fuegian shores felt probably only disappointment when recognising the familiar genera and representative species of his European home: he would naturally infer, with a corresponding diminution of interest, that analogous latitudes produce an analogous vegetation in opposite hemispheres. Experience has proved the fallacy of such a conclusion; and accordingly the Flora of Fuegia claims an additional and peculiar charm, in its being the only region south of the tropics where the botany of our temperate zone is, as it were, repeated to a very considerable extent."

Sketched by Dr. Hooker.

"Balsam-bog" plant (Bolax Glebaria). Falkland Islands. Page 263.

CHAPTER XI.

Natives of Furgia. — Weapons. — Birds. — Climate. — Meteorological Abstract for October. — Prevailing Winds. — "Williwaws." — Tides. — Permanent Mark at the Mean Level of the Sea. — Sail from St. Martin's Cove. — Burdwood Bank. — Beauchêne Island. — Anchor in Port Louis. — English Barque, Governor Halkett. — Her Majesty's Ship Philomel. Trees from Hermite Island planted. — Result of Observations. — Tides. — Permanent Marks to indicate the Mean Level of the Ocean.

CHAPTER XI.

DURING our stay in St. Martin's Cove, we had frequent visits from the natives: they came in small parties, and always took up their quarters in the wigwam at the head of the Cove, which seemed to be a kind of joint property. It was a most miserable shelter from the inclement weather of this period of the year; but so inured to it are these people, that it was not unusual to see them walking knee-deep in the snow on some of the bitterest days, without any covering beyond a small otter skin over the shoulders, reaching about half way down the back. 1842. Sept.

The Fuegians are truly described as the most abject and miserable race of human beings. The Esquimaux of the northern regions are as far superior to them in intelligence and civilization as are the New Zealanders of the southern hemisphere; and even the barbarous inhabitants of the interior of Australasia live in a state of comparative comfort.

Overawed by our superior numbers, they were kept in good order, with the exception of a few trifling instances of petty theft. They are admirable mimics, and were fond of the company of our people, singing and dancing with them, and entering into every kind of fun, for which seamen are so famous; and it was both amusing and interest-

1842. Sept.

ing to witness their attempts to repeat the words and tunes of their songs, which they accomplished with a wonderful degree of facility. Landing one morning unexpectedly, I found our people teaching them to wash their faces; but the soap making their eyes smart, their ablutions were afterwards confined to the feet and hands: they then powdered their hair with flour, and decorated them with ridiculous ornaments, the natives greatly enjoying their altered appearance, heightened, in no small degree, by the present of a complete suit of clothes each, and many useful articles they got on board the ship: they went away in the evening rich and happy.

The greatest number we saw at one time amounted to no more than fifteen. They were living together like one family, near the beach in Joachim Bay, and the parties which visited us generally consisted of three men, two women, and two or three children. The men came on board the ships without hesitation, but the women were never allowed to leave the canoe, and employed themselves diving for sea eggs, or picking up limpets, which are their principal food.

The only weapons we saw in their possession were spears of three kinds, not unlike those of the Esquimaux, but of very inferior manufacture: they were of various sizes, according to the purpose to which they were applied, and to suit the power and size of the person using them. The largest was a beech wood staff, nine feet long and four

inches in circumference, with a strong bone head, thirteen inches long, quite straight, and tapered to a fine point: the bone head, which was fitted into a socket at the heavier end of the spear, was secured by a strong seal skin thong, about a foot from each end of the spear, and used only for the destruction of the largest kind of seals. The bone head, when struck into the animal, trips out of the socket and acts as a toggle, whilst the released staff performs the part of a buoy. 1842. October.

Another spear, longer and lighter than the above, stained with red ochre, and armed with a barbed bone head, finely pointed, but without any seal skin thong attached, was probably employed against the smaller kinds of seals, or perhaps in warlike meetings, for the first party we met had spears of this nature concealed in the wood.

The third kind of spear was hardly five feet long, and proportionably slender, armed with a bone head with seventeen notches, increasing in size from the point to the heel, securely fixed to the spear by a lashing of seal skin, and probably used for killing birds.

In one of the canoes that came alongside the ship, we observed three arrows of very rude make, pointed with obsidian, which they were unwilling to part with, and the bow they kept carefully concealed. In the same canoe was a white dog, which they were so much afraid of losing that I could not prevail upon them to let me see it. This party were strangers; and, on landing at the head of the

1842. October. cove, they were received in silence, and with a solemn countenance, by our first friends. They walked up to the wigwam, and seated themselves in a circle round the fire, without speaking a word or manifesting any expression of satisfaction or otherwise, at meeting. The women, as usual, remained in charge of the canoe, and in about an hour they all left the harbour. They had come from one of the neighbouring islands, and were in a more filthy state than any we had before seen; their bodies and heads being smeared with red ochre, mixed with oil or grease of intolerable smell.

The Fuegian men are of smaller stature than their northern prototypes, the Esquimaux. The average height of six of them scarcely exceeded five feet. They are an indolent race, throwing the labour of paddling the canoes and collecting shell-fish upon the women. Their conduct throughout the whole period of our stay was peaceable and inoffensive, and their cheerfulness and good temper rendered their presence agreeable to us rather than otherwise; and, from the number of useful presents they received in the shape of knives, axes, saws, and all kinds of carpenters' tools, fishing-lines, hooks, and a great variety of other articles, I trust our visit will not have been without considerable benefit to them.

Their language is most difficult and unpronounceable, so that we could only communicate with each other by signs, and of course could not gain any knowledge of their religious ideas;

but we may now hope that the day is not far distant when the blessings of civilisation and the joyful tidings of the Gospel may be extended to these most degraded of human beings, for I have heard that at this moment some pious missionaries are about to commence their labours among the Patagonian Indians who live along the southern coast of the American continent.

They do not entertain that objection to having their hair cut, which Captain King mentions of the Fuegians in Fortescue Bay. After reading that anecdote I thought it right to proceed with caution to induce them to let my coxswain cut a lock from off some of our visitors; on presenting each of them with some hair they had seen him cut off my head, they did not make the least objection to his cutting theirs and giving it to me; and before we left the harbour, nearly all of them had their long dirty hair removed, and expressed much satisfaction at their short crop, which greatly improved their appearance.

We were prevented by the unsettled state of the weather from extending our researches to the neighbouring harbours or islands; but the able and detailed survey and description of them by Captains King and Fitzroy leave us nothing to regret on that account, beyond the gratification of our own curiosity. The suddenness and violence of the "williwaws" from off the high lands render navigation in open boats too dangerous to be hazarded, except there had been any object of sufficient im-

1842. October. portance to justify the risk; and our people were more usefully employed, whenever the weather admitted, in cutting down such trees as the carpenters selected as fit for building, to be conveyed by us to the settlement at Falkland Islands, where timber was greatly wanted, and in taking up, under the direction of Dr. Hooker, many hundred young trees of various kinds, which I was in hope might succeed when transplanted into those islands, — an important desideratum.

We found patches of celery near most of the wigwams, and thinking it probable that plant was cultivated by the natives, we cleared several small spaces and sowed a quantity of seeds of various kinds of vegetables, such as parsley, cabbages, potatoes, peas, beans, and the Kerguelen Island cabbage, in the hope of their being eventually useful to them. Several pairs of rabbits, which we had brought for the purpose from Falkland Islands, were landed at different parts of the harbour, and on some of the adjacent islands; and from the luxuriance of the vegetation I have no doubt they will thrive and multiply exceedingly.

Birds of different kinds were daily arriving from the northward, and our sportsmen succeeded in supplying our tables with woodcocks, quails, upland geese, and water-rails, whilst the cormorant, loggerhead duck, and kelp geese were eagerly solicited by the less fastidious Fuegians, who seemed to prefer them when in a putrid state.

We were unsuccessful in all our attempts at

fishing; it was therefore probably too early in the season for the fish to enter the harbours. One evening we observed the water of the cove to be of a bright red colour; and, on examination, found it to be caused by an extraordinary multitude of a small species of cray-fish, filling the sea with their numerous progeny, at first not discernible in the mass, and probably brought here for the benefit of the fresh water, which poured into the head of the cove in a large continuous stream.

1842. October.

The annexed abstract from our Meteorological Journal for October, the second spring month of these regions, will serve to show that, although its mean temperature (which, in all other parts of the world is generally very nearly that of the whole year) is rather more than eight degrees lower than the temperature of April, its corresponding month in England, yet it must be borne in mind that our position was more than four degrees and a half of latitude nearer to the Pole than the Greenwich observatory; and if the difference be something greater than is due to this cause, still our observations at this place appear to contradict the general assertion that the southern hemisphere is colder by ten degrees than the northern. The range of temperature near Cape Horn in October is from 56° to 30°. In April, in England, it is much wider — from 74° to 29°.

The quantity of rain gives evidence of the humidity of the climate; and although there were

1842. ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS. — ST. MARTIN'S COVE, NEAR CAPE HORN, IN OCTOBER, 1842.

Day.	Temperature of the Air in Shade.			Mean Temperature of Sea on Surface.	Temperature at 9 A.M		Quantity of Rain.
	Max.	Min.	Mean.		Air in Shade.	Dew point.	
	°	°	°	°	°	°	Inches.
1	48	39·5	43·4	44·7	44	39	·09
2	49·5	42	45·3	44·6	47	40	·05
3	48	41	44·1	44·5	47	42	·01
4	47	39·5	42·9	44·8	42	38	·27
5	47	39	43·1	45	46	40	·32
6	50	35·5	43·2	45·3	44	38	·02
7	47·5	37	41·6	44·1	45·5	40	
8	50	37·5	44·6	45·7	44	42	·31
9	53	40	46·7	45·7	49	27	
10	56	41	47·1	46	51	39	
11	54	37·5	43·2	45·3	48	31	
12	43	36·5	40·0	45	41	36	·18
13	40	34	36·9	44·5	38	27	·07
14	47	38	41·6	44·8	41	32	·09
15	45·5	38	40·8	44·8	44	39	·12
16	43	37	40·4	44·6	43	32	·13
17	44	36	40·1	44·5	42	38	·08
18	38	33·5	36·1	43·6	35	35 *	1·09
19	39·5	32	36·3	43·5	36	36 *	·68
20	36	30	33·2	43	35	35 *	·28
21	45·5	33	38·4	44	37	33	0·37
22	40·5	34	36·2	43·5	36	30	0·16
23	39	32·5	35·8	43·6	36	28	0·32
24	40·5	34	37·4	43·7	34	34 *	0·30
25	49	39	42·6	44·8	43	38	0·50
26	43·5	37·5	39·6	44·2	40	34	0·01
27	44	37	40·7	44·2	40	40 *	0·38
28	51	41	44·2	45·2	45	43	
29	50·5	42	46	45·6	48	40	
30	46	41	43·3	45	45	45 *	·04
31	51	36·5	46·7	46·1	47	42	·02
	56	30	41·34	44·64	42·4	36·6	5·91

ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS.—ST. MARTIN'S COVE, NEAR CAPE HORN, IN OCTOBER, 1842. 1842.

Day.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·578	29·349	29·434	S.W.	2·3	0 g.r.
2	·745	·570	·625	S.W.	1·9	0 g.
3	·766	·599	·693	S.W.	1·5	0 g.r.
4	·761	·540	·670	S.W.	2·0	4 b.c.
5	·745	·537	·631	S.W.	1·5	0 r.
6	·745	·420	·614	E.N.E.	2·3	4 b.c.
7	·365	·168	·252	E.N.E.	2·3	2 b.c.
8	·522	·280	·414	Variable	1·0	6 b.c.
9	·498	·211	·389	S.W.	1·5	4 b.c.
10	·464	·185	·335	Variable	1·2	4 b.c.
11	·178	·037	·096	N.W.	1·0	6 b.c.
12	·316	·112	·208	S.W.	0·8	4 b.c.
13	·686	·337	·534	S.W.	3·0	0 q.s.
14	·699	·098	·435	S.W.	1·9	0 q.
15	·214	·052	·104	S.W.	2·2	0 g.r.
16	·432	·045	·316	S.W.	2·4	0 g.q.
17	28·968	28·592	28·693	S.W.	2·2	0 q.n.
18	·632	·252	·415	S.S.W.	3·5	0 q.s.
19	·977	·625	·800	S.W.	2·1	0 q.s.
20	29·176	·661	·911	S.S.W.	3·8	0 q.s.
21	·191	·483	·881	S.S.W.	2·1	0 g.s.
22	·008	·455	·621	S.W.	3·7	0 q.s.
23	·296	29·035	29·210	Westerly	1·6	2 b.c.p.s.
24	·486	·310	·417	S.W.	2·0	0 q.s.
25	·554	·502	·532	S.W.	1·6	3 b.c.
26	·656	·430	·540	S.W.	2·3	4 b.c.q.
27	·802	·694	·757	S.W.	1·2	0 g.r.
28	·712	·313	·463	E.N.E.	1·1	3 b.c.
29	·362	·256	·305	S.W.	1·2	5 b.c.
30	·416	·298	·308	S.W.	0·4	0 r.
31	·726	·314	·492	Easterly	0·5	4 b.c.
	29·802	28·252	29·293		1·9	

1842. October. only six days in which neither rain nor snow fell, the showers were seldom as heavy or of as long continuance as at New Zealand. But, according to Captain King's account, there is a rainy season here as in other regions; for he states that in the month of May eight inches and a quarter of rain were found in Captain Foster's pluviameter at the end of thirty days, and when allowance is made for evaporation, he considers that no less than twelve inches must have fallen during that time. It would be better to register the indication of the pluviameter daily, and thus obtain a more accurate knowledge of the evaporation and deposition of the moisture of the atmosphere. The mean temperature of the dew point shows 5°·8 dryness; it is therefore greater than at New Zealand, and rather less than in England, where in April it amounts to 6°·4.

The mean height of the barometer was 29·293 inches, and its range during the month, 1·55 inches. The observations did not extend over a sufficient space of time to enable us to determine the amount of atmospheric tide: it is, however, small, not exceeding ·026 of an inch, the least pressure occurring about noon, and the greatest near midnight.

The prevailing winds are from the S.W., and we had four storms attended with snow, during which the gusts, or "williwaws," were so fierce as to carry the spray far higher than the mast-heads of our ship, although less than a quarter of a mile from the weather shore; and when they struck her on the

1842.
October.

broadside, they caused her to heel over as much as when under the heaviest press of sail she could carry. During some of the more violent of these hurricane squalls Lind's wind-gauge showed an amount of pressure equal to 36 lbs. on the square foot. These storms were generally predicted by a low barometer; and the Fuegians foretold them with still more certainty, when to us there appeared no sign of their approach. Easterly winds are generally light, and accompanied by fine weather and a high barometer, and the average force of the wind, 1·9, is less than at most other places.

The height of the tide was registered every half hour from the 27th of September to the 6th of November; and more frequently about the times of high and low water; the amount of semi-diurnal inequality of the tide is as great here as at the Falkland Islands, and at first seemed to present most unaccountable irregularities; but the limited period of observation did not admit of their thorough investigation: for practical purposes, however, the following are the results.

The first high water, after full moon on the 4th of October, occurred at $3^h\ 15^m$; at new moon on the 19th at $4^h\ 0^m$; and at full moon on the 2nd of November at $3^h\ 37^m$; the mean time being $3^h\ 37^m$.

At the quadratures it was high water at $9^h\ 30^m$ on the 27th of September; at $9^h\ 0^m$ on the 11th of October; and at $9^h\ 15^m$ on the 26th of October; the mean time also being $9^h\ 15^m$.

The highest tide occurs at either the seventh or

1842. eighth high water; and the largest tide, varying from 6 feet to 7 feet 1 inch, at the eighth low water after the full and change.

From one hundred and forty observations of high and low water, the mean level of the sea was computed by Captain Crozier, and a corresponding mark cut upon the perpendicular face of the rock on the S.E. side, near the head of the cove, where we always found the best landing, and where the tide-gauge was fixed.

The latitude of the observatory, which was placed about fifty yards above high water mark at the head of the cove, was 55° 51′ 20″ S., the longitude 67° 32′ 10″ W., the magnetic dip 58° 12′ 8″ S., and the mean variation for the month of October 22° 56′ 0″·2 E.

Nov. 7. On the 7th of November we sailed from St. Martin's cove, and the wind being favourable, we passed between its south cape and Chanticleer Island. The channel is fully a mile in width; but there are several dangerous rocks in it, which show themselves only when there is sufficient swell to form breakers. One of these hidden rocks lies in the channel between the island and the conspicuous rock off it; another lies about one-third of a mile outside of it, and is about one-fifth of a mile from Chanticleer Island, in a line with Mount Foster.

With the wind on our starboard beam we rounded Cape Horn in the forenoon, at a distance of three or four miles, the surf on the rocks off the cape was grand, and the white foam along the whole extent

of the coast line, caused by the heavy southerly swell, was rendered more remarkable by the black cliffs against which it was beating. 1842.

On the afternoon of the 11th, being in latitude 54° 18′ S., and longitude 60° W., and near the danger called Burdwood Rock on the Admiralty chart, we hove to and obtained soundings in fifty fathoms; but we could not see the rock, nor any appearance of broken water, although the weather was clear, and the sea sufficiently rough for breakers to be visible at a considerable distance. The remainder of the day was spent in sounding and surveying the Burdwood Bank, which we traced between twelve and thirteen miles to the eastward, before darkness put an end to our examination. Nov. 11.

The least depth of water we found upon it was twenty-four fathoms, the shoal forming a narrow ridge of volcanic rock, lying nearly east and west, the soundings rapidly increasing in depth on either side of the ridge, and consisting of coarse sand, small stones, and shells. The colour of the sea was observed to be a deep brown over the bank, some large patches of seaweed (macrocystis) were seen as we approached it, and the line of the bank was marked by a rough ripple upon the surface.

Ten miles to the northward we sounded in eighty fathoms on fine black sand; and thirty miles further to the north we had no soundings with three hundred fathoms.

The next morning at 6 o'clock Beauchêne Island was seen, and we hove to off Cape Pembroke at Nov. 12.

1842. midnight, to wait for daylight and clear weather; but the wind blowing from the westward the next morning, it occupied us twelve hours to beat up Berkeley Sound; and it was not until 6 o'clock in the evening that we anchored in Port Louis.

Lieutenant Sibbald met us outside the narrows with despatches and letters from England, which had been brought by H.M. brig Philomel during our absence; he also gave a satisfactory account of the health and conduct of the party under his command. I had the gratification of receiving a letter from the secretary of the Admiralty, conveying to me the expression of their lordships' great satisfaction at the successful result of our exertions, which, together with one of the same date, acquainting me with the promotion of Captain Crozier, Commander Bird, and Lieutenant A. J. Smith, will be found in the Appendix.

Nov. 14. An English barque, the Governor Halkett, with a valuable cargo of oil from Sydney, arrived the next day, having sprung a leak soon after leaving the harbour. We immediately sent as many hands from both ships as could work on board to discharge her cargo and look for the leak. It was fortunate we were in the harbour at the time, or this fine vessel must have been lost for want of means of repairing her. As it was, it occupied our people nearly a week in clearing her out, when a most dangerous leak was found in her bows and repaired by our carpenters; and, although every exertion was made to restow her cargo, it was not until the 1st of Decem-

ber she was able to proceed on her voyage to England. 1842.

The Philomel came into Port Louis on the 22nd, Nov. 22.
and remained a few days with us, which afforded me an opportunity of acquainting Captain Sulivan with the exact position of the Burdwood bank, with the view to a more accurate examination than our time had admitted, and which it was of importance to accomplish, on account of the great danger of the loss of spars that vessels are liable to in passing over it, owing to the irregular breaking sea which must occur there during stormy weather.

The Philomel sailed on the 2nd of December in Dec. 2.
prosecution of the survey of the islands, with which duty Captain Sulivan was charged.

Whilst the greater part of our crew were engaged on board the Governor Halkett, the remainder were employed landing the timber and young trees we had brought away from Hermite Island; the latter amounting to about eight hundred, consisting principally of the deciduous and evergreen beech as timber trees, and others of a more ornamental kind, of shrubby growth, were carefully planted under the protection of the substantial wall that enclosed the burial-ground; and, as nearly all of them put forth fresh buds soon after they were planted, they gave good promise of eventually furnishing these islands with trees which they greatly require.

As we could not spare hands to go cattle-hunting, and fresh beef could only be had from the govern-

1842. December. ment store in small quantities, fishing and shooting parties were occasionally sent out; and, together with the large collections of penguin's eggs that were made, we had no reason to complain.

The proper season for resuming our operations in the south being now at hand, our observations were concluded in the early part of December, and the ships made ready for sea.

The meteorological abstracts and remarks are printed in the Appendix.

The result of our magnetic observations gave the mean dip, and variation for each month as follows: —

	Variation.	Dip.
For April - -	17° 50′ 18″ E.	52° 26′ 7″
May - -	43 47	25 7
June - -	38 10	25 5
July - -	35 39	22 4
August - -	33 0	23 1
September -	32 19	
October - -	30 10	
November -	27 33	18 8
December -	- - -	16 1

The latitude of the observatory 51° 32′ 5″ S., and the longitude 58° 7′ W.

The state of the tide was registered every half hour between the 10th of May and 6th of September, and more frequently about the times of high and low water, from which the following general results were deduced, without reference to some remarkable irregularities which occurred, and which belong to the phenomena of periodical inequalities.

1842. December.

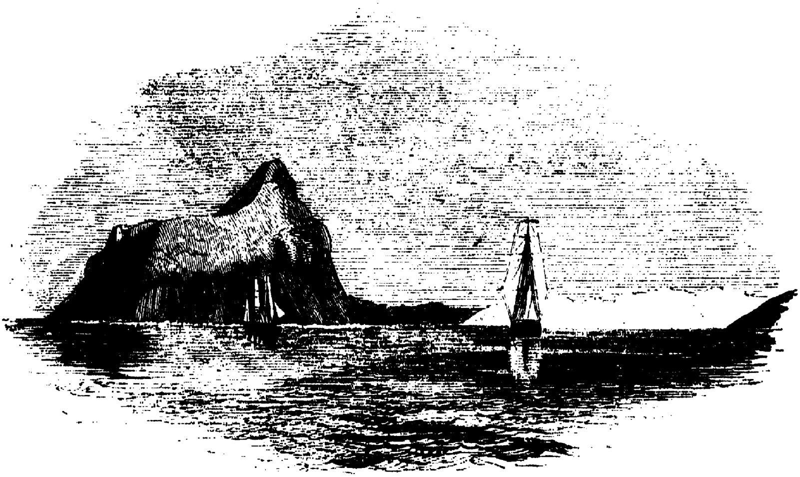
The mean time of high water at new moon is $4^h\ 45^m$; at the first quarter, $5^h\ 5^m$; at full moon, $6^h\ 28^m$; and at the third quarter, $5^h\ 9^m$ after she passes the meridian.

The highest tide is the third high water after the full or change of the moon.

The greatest rise and fall is 6 feet 2 inches at new moon; but at full moon it varied from 4 feet 10 inches to 6 feet, and averages a smaller spring tide than occurs at new moon.

The largest spring tide, or difference between high and low water, invariably occurred at a low water, and as invariably at the low water nearest to midnight.

The mean level of the sea was deduced from five months' observations; and two permanent marks were made 5 feet 8 inches above it, first by levelling the top of a rock a little to the southward of the pier and watering-place; and again by cutting a ledge in the face of the cliff close by it. Two copper plates were fixed in the rocks, marked thus: "5 feet 8 inches above the mean level of the ocean, August, 1842., H.B.M. ships Erebus and Terror;" by which any difference that may occur in the level of the sea in those parts may readily be detected.



Cockburn Island and Admiralty Inlet. Page 322.

CHAPTER XII.

Route determined. — Sail from Falkland Islands. — Circle of Mean Temperature of the Ocean. — Make the Pack. — Land Discovered. — Danger Islets. — Whale Fishery. — Mount Percy. — Meteorological Abstract for December. — D'Urville Monument. — Mount Haddington. — Cockburn Island — Its Botany. — Admiralty Inlet. — Fixed Land Ice. — Clear the Main Pack. — Meteorological Abstract for January.

CHAPTER XII.

ON the morning of the 17th of December we sailed from Port Louis, upon our third visit to the antarctic regions, selecting the meridian of 55° W., where I was in expectation of meeting with a continuation of Louis Philippe's Land, and hoped, by following the coast line to the south-eastward, keeping between the land and pack, to combine the survey of its shores with the attainment of a high latitude; but, determined, in the event of meeting with any insuperable obstruction, to relinquish our attempt in that quarter, and endeavour to follow the track of Weddell, by which he reached the latitude of 74° 15′ S., three degrees further than any preceding navigator, where we had every reason, from his account, to expect we should find a clear sea, and considerably extend the limits of his daring researches. 1842. Dec. 17.

By noon we were fairly at sea again, the Seal rocks bearing N. 69° W., distant four miles; and, favoured by a smart breeze from the westward, we soon lost sight of the land — not one individual in either ship, I believe, feeling the smallest regret on leaving the Falkland Islands; every one rather rejoicing in the prospect before us, of again resuming the more important business of our voyage. Steering to the S. by E. in order to pass

1842. to the eastward of Clarence Island, one of the South Shetland group, we crossed the line of equal temperature of the ocean throughout its entire depth,
Dec. 20. at 10 A.M. on the 20th, in latitude 55° 48′ S., and longitude 54° 40′ W.; but the weather did not admit of our sending thermometers lower than a thousand fathoms, at which depth the temperature was 39°·5; at 750 fathoms, 39°·3; at 600 fathoms, 39°·4; at 450 fathoms, 39°·6; at 300 fathoms, 39°·6; at 150 fathoms, 40°; and at the surface, 40°. The specific gravity of water from 150 and 600 fathoms was the same as at the surface, 1·0277 at 45°. We found by our observations that during the two preceding and following days we were carried to the eastward, by a current, at the rate of rather more than twenty miles daily.

Dec. 24. On the morning of the 24th we saw the first iceberg, in latitude 61°. At this time we were about fifty miles to the north-east of Clarence Island; but owing to the thick weather which prevailed, we could not see it: the wind increased to a gale from the westward in the afternoon, which reduced us to a close-reefed main-topsail and storm staysails, and it blew with great violence throughout the night; but as we had plenty of sea-room, with only few bergs about us, and clear weather, it gave us no uneasiness. The temperature of the sea also being above 35°, we were assured that no large body of ice could be near us, so we stood to the southward.

Dec. 25. The gale moderated at 9 the next morning, by

which time, being under the lee of Clarence Island, we found some shelter from the heavy westerly sea we had during the night experienced. Being Christmas Day, our people, as usual, had an additional allowance issued to them, and it was passed by us all cheerfully and happily, although the gale still whistled through the rigging, and we were surrounded by a great multitude of icebergs. We were indebted to the kindness of Lieutenant Governor Moody, of the Falkland Islands, for the good old English fare of roast-beef, which he provided by presenting each ship with a fine fat ox, which had been fed on one of the tussock-covered islands, for this especial occasion. 1842.

In the afternoon we met with and sailed through several streams of loose ice, and soon afterwards the main pack was seen from S.S.W. to E. At this time we were in latitude 62° 30′ S., and longitude 52° W., when, the wind falling light, and there being a considerable swell amongst the ice, we were obliged to stand off to the northward for the night.

During the next day we beat along the pack edge to the westward, against a moderate breeze, which afforded us an opportunity of examining it from the mast-head, as we worked in amongst the loose ice off its margin. As far as we could see, the pack appeared tolerably open; but I was desirous of getting between it and the land to the westward, and therefore did not venture so far as to endanger the vessels getting beset in so exposed a situation. Dec. 26.

1842. Dec. 27. Light adverse winds and thick weather on the 27th greatly impeded us. We were amongst loose ice, and many bergs; these were in a state of rapid dissolution, from the temperature of the air being up to 37°, and that of the sea to 34°. Frequent loud reports and crashes were heard as they broke up and rolled over, so that it was dangerous to approach them, and an unusual sight to us; for on our two former visits to the southern regions, we had never seen the least appearance of thaw or of breaking up of bergs.

Dec. 28. Land was discovered on the 28th, at 6 P.M. It presented to our view a remarkable cape, with a deep indentation to the northward of it, having the appearance of a good harbour, and terminated by a less conspicuous headland. Still further to the northward, and at a great distance, another promontory was clearly seen, which I believe to be the "Point des Français" of Admiral D'Urville: the northernmost cape of the land he named "Joinville."

The summit of the highest land to the southward was partially concealed by mist, but which occasionally cleared away, and exposed to view an even round topped mountain, covered with snow, out of which two warty excrescences of rock projected, of very curious appearance, owing to their ruggedness, and being quite free from snow. Wreaths of snow or mist which whirled round the hill-tops, led Captain Crozier and his officers to believe they could perceive smoke issuing from

them; it was not observed by any one on board the Erebus, but it might have escaped our notice. I mention it here to call the attention of any future visiter to the circumstance.

A high islet, of extraordinary figure, was seen at a great distance from the shore. I named it Ætna Islet, from its resemblance to that volcano: it was entirely covered with recent snow, and, but for its great height, might easily have been mistaken for an iceberg.

An enormous glacier, of several miles in breadth, descended from an elevation of about 1200 feet into the ocean, where it presented a vertical cliff of about 100 feet high (the great southern barrier of 78° 15′ S. in miniature), near which we observed the largest aggregation of icebergs, which had evidently been broken away from it, that I ever remember to have seen collected together.

Having clearly determined the general outline of the land, although, from the want of good observations, being unable to give its exact position, we bore away to the south, along a coast-line of icy cliffs, in a sea thickly studded with grounded bergs: a strong tide or current amongst them forming whirlpools, rendered the steerage of our ships at times difficult, and hurried us onwards to the southward, until at length numerous low rocky islets appeared amongst heavy fragments of ice, by which they were completely concealed until we were nearly down upon them. I called them Danger Islets. They obliged us to haul off to the

1842. eastward, and we had fortunately gained an offing before midnight, when it became so thick that we could not see beyond a quarter of a mile.

Dec. 29. Notwithstanding the fog and numerous bergs about us, we stood to the south-east until we met with the pack edge, and almost immediately afterwards an island was seen within three times the length of the ship, although we had tried for soundings every quarter of an hour without striking ground: we tacked, and made the fog signal for the Terror to do so likewise. The cliffs of the island through the fog appeared so perpendicular as to admit of the ship going alongside; and well it was they were seen in time to avoid running against them, as we had no suspicion of being near any land.

We sounded at $1^h\ 20^m$ P.M. in one hundred and sixty-two fathoms, on sand and small stones, and found the current setting to the N. N. W. at the rate of half a mile hourly. The fog cleared away, and we saw the small high island against which we so nearly ran. It is the southernmost of the Danger Islet group. I named it Darwin Islet, after Charles Darwin, Esquire, the talented companion of Captain Fitzroy during his interesting voyage. The wind shifting to the southward brought clear weather, and as we stood towards the land, with the intention of continuing its survey, under all sail upon the port tack, we passed numerous streams of heavy ice, and received severe blows in forcing a passage through some of them.

We observed a very great number of the largest-sized black whales, so tame that they allowed the ship sometimes almost to touch them before they would get out of the way; so that any number of ships might procure a cargo of oil in a short time. Thus within ten days after leaving the Falkland Islands, we had discovered not only new land, but a valuable whale-fishery well worthy the attention of our enterprising merchants, less than six hundred miles from one of our own possessions. 1842.

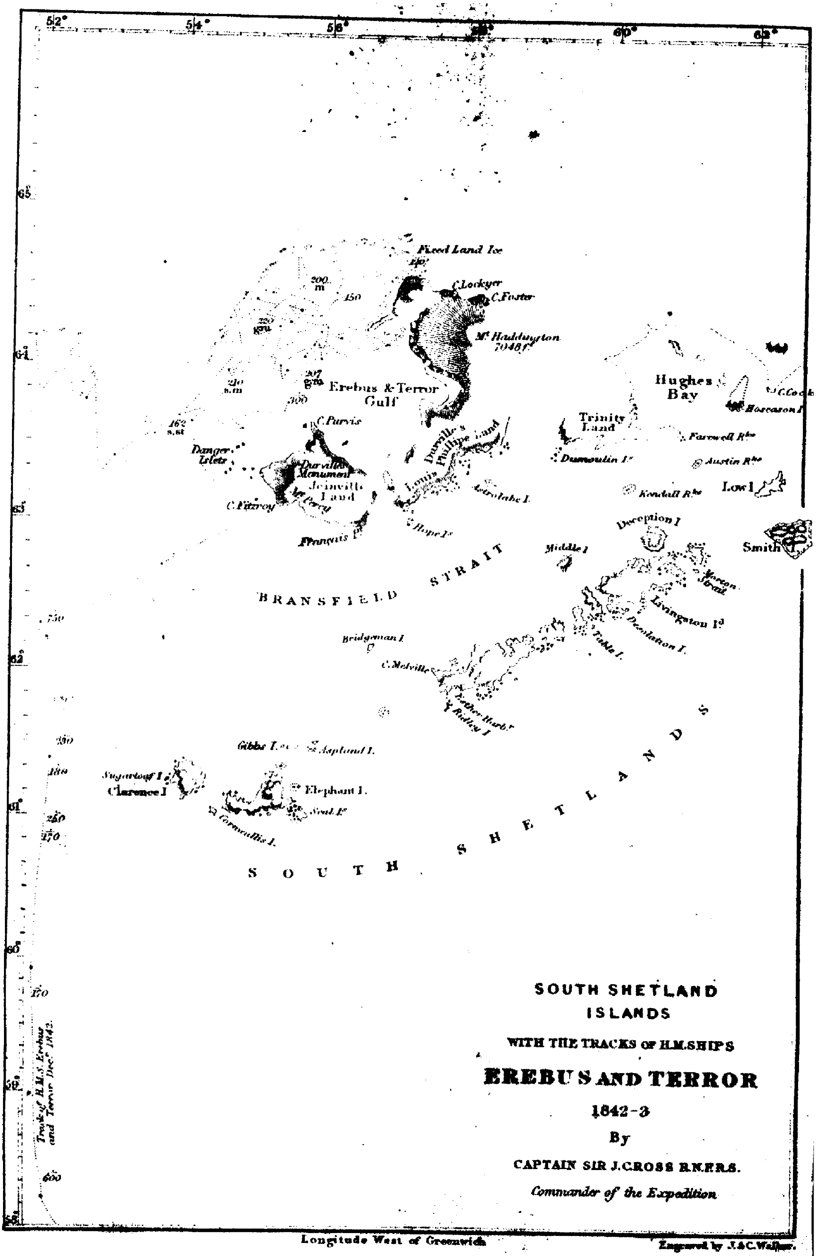
The birds we met with off this land were of the same kinds we had seen on our previous visits to the icy regions; but the great penguins were more numerous than we had any where before found them.

It blew a strong breeze from the southward, with frequent snow-showers and sharp squalls; and we found the pack so close, that we had great difficulty in making our way through it to the westward; at one time the Terror became so entangled amongst it, that I was apprehensive of her getting beset, and dodged about for some hours in a more open space, until she was released. A great number of grounded bergs was probably the occasion of the loose ice being packed so closely just at this point. Dec. 30.

At noon we were in latitude 63° 36′ S., longitude 54° 33′ W. Darwin Islet, of about 600 feet elevation, with several rocks, and two or three smaller islets near it, were seen when the fog cleared away. The main land was also seen bearing from W. N. W. to S. S. W., and with

1842. Dec. 30. the assistance of a fine breeze from the south, we succeeded, by 8 P. M., in forcing our way through the loose ice into an extensive sheet of clear water, between the land and the main pack.

With a light south-east wind we stood towards the land until midnight, when it fell calm for a short time. We tried for, but did not obtain, soundings with three hundred fathoms of line. It was a beautiful night, and we could distinguish the land as far to the southward as south-west entirely covered with snow, except in a few places where perpendicular cliffs, upon which it could not lodge, broke through the mountain glacier, and first arrested our attention. The summit of the mountain to the northward terminated in two remarkable peaks, whose elevation above the level of the sea was found to be 3700 feet. I named it Mount Percy, after Rear Admiral the Honourable Josceline Percy, the Commander-in-chief of the Cape of Good Hope station, to which these newly-discovered lands belong. The high, bold cape which forms the south extremity of the island, upon which Mount Percy rises, I named Cape Purvis, after Commodore Purvis, of whose valuable assistance to our expedition I have already spoken; and the high conical island near it was called Paulet Island, after our good friend and brother officer, Captain the Right Honourable Lord George Paulet, R. N., to whom we equally owe many obligations. Paulet Island is 750 feet above the sea, and its cliffs appear



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from the distance to rise so abruptly as to render it quite inaccessible. 1842. Dec. 30.

An islet to the northward of Paulet Island was named Eden Islet, after Captain Charles Eden of the Royal Navy; and its lofty southern cape, after Captain William David Puget of the Royal Navy. The low, eastern, extreme point, off which lie the Danger Islets, was called Point Moody, after the Lieutenant Governor of the Falkland Islands: the northern headland of the apparent inlet, the first land seen by us on the evening of the 28th, I named Cape King, and the remarkable rugged cape to the southward, Cape Fitzroy, after my friends, Captain P. P. King, R. N., and Captain R. Fitzroy, R. N., from whose admirable surveys we had derived much advantage.

A wide and deep inlet to the north-west, in which were numerous high, conical, and crater-shaped islets, suggested the belief that there is a passage between Joinville Land and Louis Philippe Land into Bransfield Straits. The low western termination of the land was named Point Bransfield, after Edward Bransfield, Esq., Master of the Royal Navy. The land from Point Bransfield is quite flat for a great distance from the shore towards Mount Percy, and near the centre of this extensive snow-covered plain a very remarkable tower-shaped rock rises to a conspicuous height: it was probably seen by Admiral D'Urville from the northward, at a greater distance, as it is marked on his chart as an "isle supposée," the low land upon which it stands

1842.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—DECEMBER, 1842.

Day.	Position.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temp. at 9 A.M.		Rain in Gauge.
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in shade	Dew point.	
	° ′	° ′	°	°	°	°	°	°	Inches.
1	Port Louis.		49·5	37·5	42·6	49	46	32	—
2			55	37	44·1	49·3	51	42	0·05
3			51	36	43·2	48·2	51	47	0·06
4			45·5	36	40·9	48·4	43	30	0·02
5			50	35	41·9	47·8	42	33	0·02
6			54	39	45·8	48·8	46	46*	0·10
7			52	40	45·7	48·9	49·5	41	—
8			58	41	47·9	48·9	50	37	0·01
9			60·5	43	51·2	49·4	55	42	—
10			53·5	40	45·5	49·0	47	41	—
11			50	37·5	44	49·2	48	42	0·04
12			49	37·5	44·7	48·9	47	46	0·02
13			50	40	44·2	48·5	46	37	0·07
14			49·5	42	45·5	48·8	46	41	0·01
15			57	42	48·9	49·7	52	47	0·02
16			59·5	38	50·5	50·3	52	44	—
17	Off Cape Pembroke		63	46	54·4	49·3	61	49	—
18	52 54	56 43	60	46	52	47·4	55	47	—
19	54 23	56 01	46	42	44·9	44·5	46	42	—
20	55 51	54 42	51	41	45·4	43·3	46	41	—
21	57 04	53 22	43	36	39·5	38·3	40	38	0·16
22	58 16	52 0	39	34	35·4	35·4	35	32	—
23	59 50	51 50	38	33·5	35·3	34·3	34	30	—
24	61 23	52 19	36·5	34	35·1	33·6	36	36	—
25	62 14	52 05	35·5	28	32·2	32·2	33	33*	—
26	62 31	51 36	33·5	29	31·7	32·0	34	32	—
27	62 18	51 57	37·5	32	34·2	33·3	33	33	—
28	62 44	53 43	37	32	33·8	32·7	34	32	—
29	63 40	53 42	35·5	30·5	32·1	31·8	33	32	—
30	60 36	54 33	33	29	31	31·6	31	29	—
31	63 56	55 28	40	28	33	32·3	33	26	—
			60·5	28	41·82	43·07			0·58

* Deposit of rain, snow, or fog.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—DECEMBER, 1842.

1842.

Days.	Barometer (corrected.)			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·300	29·059	29·206	S. Westerly	2	A.M. 4 b.c. P.M. 0 d.
2	·182	28·914	·013	A.M. Westerly. P.M. Southerly	1 3	0 p.r. 4 b.c.p.r.
3	·181	29·031	·085	A.M. N.W. P.M. East	2	2 b.c.p.r.
4	·393	·060	·212	Southerly	4	A.M. 3 b.c. P.M. 3 b.c.p.h.
5	·554	·400	·500	S.S.W.	3	A.M. 3 b.c.p.s. P.M. 1 b.c.g.
6	·497	·298	·396	A.M. West P.M. S.S.W.	2	A.M. 0 g.r. P.M. 2 b.c.
7	·523	·253	·384	N.N.W.	2	0 m.r.
8	·437	·296	·390	S. Westerly	4	3 b.c.
9	·441	·346	·394	Westerly	2	3 b.c.
10	·599	·429	·550	S. W.	3	A.M 2 b.c. P.M. 0 q.p.r.s.
11	·676	·539	·614	S.W.	4	A.M. 2 b.c.p.q.r. P.M. 2 b.c. q.
12	·638	·029	·285	N.N.W.	2	0 g.r.
13	·512	·133	·407	S.S.W.	A.M. 6 P.M. 4	3 b.c.q.p.r.
14	·834	·496	·627	S.S.W.	4	1 b.c.p.q.r.
15	·992	·840	·903	S.S.W.	3	3 b.c.
16	·983	·682	·838	Westerly	3	3 b.c.
17	·711	·392	·570	W.N.W.	3	5 b.c.
18	·447	·258	·334	Westerly	2	A.M. 5 b.c. P.M. 1 b.c.g.p.r.
19	·498	·233	·313	W.S.W.	5	A.M. 4 b.c. P.M. 2 b.c.g.
20	·560	·469	·526	A.M. S.W. by W P.M. Northerly	2	A.M. 2 b.c. P.M. 0 d.
21	·512	·213	·405	Westerly	A.M. 3 P.M. 8	1 b.c.m. 2 b.c.o.q.g.
22	·699	·383	·608	S.W.	A.M. 6 P.M. 3	2 b.c.p.s.
23	·798	·500	·661	Westerly	A.M. 3 P.M. 5	2 b.c.g. 0 m.q.
24	·469	·006	·254	West	6	A.M. 0 m.q. P.M. 2 b.c.o.m.q
25	·280	28·956	·116	S.W.	A.M. 8 P.M. 3	0 q.s. 3 b.c.
26	·278	29·186	·225	W.N.W.	2	0 m.f.
27	·195	·103	·141	W.N.W.	1	0 m.f.
28	·123	28·941	·036	N. Westerly	3	A.M. 0 f.s. P.M. 3 b.c.
29	28·934	·832	28·886	A.M. North P.M. South	2 4	0 f.p.s.
30	·980	·847	·908	South	5	0 m.p.s.
31	29·137	·947	29·022	S.E.	2	3 b. c.
	29·992	28·832	29·3487		3·3	

* For explanation of these symbols see Appendix, Vol. I.

1842. not being visible at so great a distance. I have named it D'Urville's Monument, in memory of that enterprising navigator, whose loss not only France, but every civilized nation must deplore.

Dec. 31. At 6 A.M. a light breeze sprung up from the eastward, to which we spread all our studding-sails, steering for the distant land to the south-west. Great numbers of the largest-sized black whales were lying upon the water in all directions: their enormous breadth quite astonished us. The colour of the sea was a dirty brown, probably occasioned by minute ferruginous infusoria, which were found in the greenish-coloured mud that was brought up by the deep sea clamms from a depth of two hundred and seven fathoms, at 1 P.M. At this time we were in latitude 64° S., longitude 55° 28′ W., the magnetic dip 62° 30′ S., variation 21° 30′ E.; the southern extreme of land bearing S. 54° W. at a distance of thirty miles, and a lofty table-topped mountain bearing about west. At 4 P.M. we came to the edge of the ice which filled the great gulf to the south-west, and in which it was so closely packed that we could not get any nearer the coast at this point; we therefore steered along it to the south-east.

1843. Jan. 1. The new year opened upon us with beautiful weather, but soon after 2 A.M., whilst running to the southward with a westerly wind, we found the ice so close, that to prevent getting beset, we were compelled to stand back to the northward, to await a more favourable opportunity, and with the hope

that the westerly breeze would drive the ice away from the shore, and leave a clear passage between them. 1843.

At noon we were in latitude 64° 14′ S., longitude 55° 54′ W. Being New Year's Day, a complete suit of warm clothing was, as customary, presented to our crews, and an additional allowance of provision given to them. In the afternoon, accompanied by Commander Bird and some of the officers, I went on board the Terror to visit Captain Crozier, and exchange the good wishes of the season. At this time it was perfectly calm, and we had a most beautiful view of the magnificent mountain which forms the most striking feature of our new discoveries. It was named Mount Haddington, after the Right Honourable the Earl of Haddington, the First Lord of the Admiralty. Its elevation, by the mean of several measurements, was found to be seven thousand and fifty feet. It rose precipitously from the coast in three horizontal volcanic terraces, the black rocky cliffs protruding through the perennial icy covering of the mountain; and, in some places, large masses of irregular shape also appeared. A small island, of a deep brown colour, of great elevation for its size, with a rock resembling a watch tower on its north point, and a high volcanic crater-like peak on its south end, being perfectly clear of snow, formed a striking contrast to the main land. It was named Cockburn Island, after Admiral the Right Honourable Sir George Cockburn, G. C. B., Senior Naval Lord Jan. 1.

1843. of the Admiralty. Its elevation above the sea was two thousand seven hundred and sixty feet, and its diameter was about twice as much.

In the evening the wind came from the north-east, and we made an attempt to force our way through the loose ice, but it closed so rapidly upon us that we were soon beset, and compelled to make fast to a floe of two or three miles in diameter. Bergs of the barrier form were numerous, and one of them, which was our inconveniently close companion the whole day, measured between four and five miles in diameter and one hundred and fifty feet high.

Jan. 2. Whilst fast to this floe, we had a good opportunity of comparing our magnetic instruments, and were gratified to find the results most satisfactory and accordant. At noon we were in latitude 64° 2′ S., and longitude 56° 11′ W., the magnetic dip 63° 17′ S., and the variation 20° 53′ E., by observations on the ice; we obtained soundings in one hundred and fifty-two fathoms, on blue mud. The smaller kind of penguins was in great numbers, and afforded much amusement to our people, scrambling through the deep snow after them; three of the great penguins were also captured: the largest weighed sixty-eight pounds.

At 1 30 P.M. we cast off from the floe, and gained a tolerably clear space; but the Terror, being further to leeward, remained beset for three hours longer, when by great exertions they succeeded in getting out, and rejoined us just before a

thick fog came over, which prevented our running to the south. During the night we stretched to the eastward, amongst streams of ice and bergs, which became less numerous as we receded from the land. 1843.

At 2 A. M. we came to the main pack, and were obliged to stand back to the westward, having accomplished my object of ascertaining the breadth of the space between it and the land, which was about twenty miles. Jan. 3.

We were prevented making any progress during the next two days by unfavourable weather, and were fortunate in having a comparatively clear space for the ships during its continuance. At 9 P. M. on the 5th, the wind blew strong from the southward, but under the lee of the land we maintained our position, whilst the loose ice from the islets and coast drifted away to the northward, leaving the shores of Cockburn Island quite clear: having moderated to a light breeze, we got close in with it at 9 A. M., when I made the signal to Captain Crozier, and we landed together and took formal possession of the island and the contiguous lands. As we expected, we found it to be entirely of volcanic formation; but the most interesting feature of our visit to this barren rock is that here the last vestiges of vegetation are to be found, and of which the following account is given by Dr. Hooker:— Jan. 5. Jan. 6.

"As regards its botany, this island may be considered one of a group, lying immediately south

1843. of Cape Horn, beyond the sixtieth degree of latitude. The number of plants ascertained to inhabit them hardly exceeds twenty-six; and one of these, a grass, the only flowering plant, does not pass the sixty-second degree; nor, consequently, reach that island, to whose vegetation the following observations more immediately refer. Previous to the voyage of the "Erebus and Terror," almost nothing was known of the vegetation which approaches nearest to the Antarctic Pole. We had yet to learn whether a flora, so situated, would be found to consist of plants which inhabit the elevated and comparatively rigorous regions of a milder clime; or of those growing in a similar latitude of the opposite hemisphere; or finally, if Nature had not there produced new and isolated species, adapted to the peculiarities of the locality.

January.

"The Flora of Cockburn Island contains nineteen species, all belonging to the orders, *Mosses*, *Algæ*, and *Lichens*. Twelve are terrestrial; three inhabit either fresh water or very moist ground; and four are confined to the surrounding Ocean. Of these nineteen plants, seven are restricted to the island in question, having been hitherto found nowhere else (besides an eighth, which is a variety of a well known species); the others grow in various parts of the globe, some being widely diffused.

"The greatest amount of novelty is found here, as in other cryptogamic floras, among the most highly organized class: for example, of the *Mosses*,

two out of five are new. There are seven *Algæ*, and two of them, or less than a third, are new. Of six species of *Lichen*, four are already described, (perhaps five), so that only one, or at most two, can be considered peculiar. 1843. Jan.

"The twelve plants of Cockburn Island that are common to other parts of the world, may be arranged according to their greater or less diffusion; for while some may be seen in all latitudes, others are sporadic, appearing in certain remote spots; and a few are confined to the regions in the vicinity of Cockburn Island.

"The four following plants are the most generally dispersed: — *Bryum argenteum*, *Ulva crispa*, *Lecanora miniata*, and *Lecidea atro-alba*. The first is a very frequent British moss, found likewise in Arctic latitudes, in many parts of the tropics, and at the Falkland Islands. The second is an Arctic *Alga*, also abounding in the temperate parts of the northern hemisphere, in the tropics, and the Falklands. *Lecanora miniata* is an arctic *lichen*, and seen in all intervening countries down to Cockburn Island; while the other *lichen* (*Lecidea atro-alba*) inhabits Britain, sub-arctic Europe, and New Zealand.

"Of the sporadic plants which follow, it is probable that some may yet be discovered in intermediate stations, having either escaped observation from their minuteness, or been described as different species; they are two mosses, viz.

1843. Jan. *Tortula gracilis*, indigenous to Europe and Cockburn Island; and *Tortula lævipila*, found in Europe and the Falklands; two sea-weeds, viz. *Desmarestia aculeata*, var. *media*, originally detected in Unalaschka (lat. 55° N.); and *Oscillatoria ærugescens?* if this latter be identical with the Irish species of that name, it had hitherto been found in one loch in Ireland only: and a *lichen* (*Collema crispum*), which is a native of Britain and other parts of Europe, where it generally grows on walls, though occasionally, as in Cockburn Island, on the ground. To this list should be added another *lichen*, recognised as a Falkland Island and European *Parmelia*, the specimens of which were unfortunately lost. The remaining two plants are well known sea-weeds, natives of several parts of the southern temperate, and antarctic ocean; viz., *Iridæa micans* and *Adenocystis Lessoni*.

"The two most striking vegetable productions of this island are a noble sea-weed, called *Sargassum Jacquinotii*, and a *Lichen*. The first of these was not found attached, but floating in the ocean among the ice, by which it was sometimes much mutilated. Though belonging to a highly variable order, it is a perfectly distinct as well as conspicuous species, first discovered at Deception Island, one of the South Shetlands, by the surgeon of H.M.S. Chanticleer, and afterwards by Admiral d'Urville, who collected his specimens nearly in the same latitude. It attains a length of three feet, is flat, and the margin runs out into longish

lobes with a solitary bladder at the base of each; the colour is a dirty chocolate brown. 1843. Jan.

"On approaching Cockburn Island, the cliffs above are seen to be belted with yellow, which, as it were, streams down to the ocean, among the rocky débris. The colour was too pale to be caused by iron ochre, which it otherwise resembles; and this appearance was found to be entirely owing to the abundance of a species of *lichen* (*Lecanora miniata*) that prevails in the vicinity of the sea throughout the Antarctic Islands, and in other parts of the globe. It grows nowhere else in such profusion: a circumstance which may arise from its preference for animal matter: the penguin rookery of Cockburn Island, which taints the air by its effluvium, being, perhaps, peculiarly congenial to this lichen.

"Immediately on landing, one plant, and only one, is easily discernible, the *Ulva crispa*. Like the *Lecanora*, it abounds in the south, and vegetates upon or near decomposing organised substances. It consists of pale green membranous fronds, barely one fourth of an inch high, and crowded together in great numbers.

"The *Mosses* grow in the soil which is harboured in the fissures of rocks: they are excessively minute, the closest scrutiny being requisite to detect them. There were, as above mentioned, only five species: two of them bore unripe capsules, and all were confined to spots having a northern exposure, and even there they were so

1843. Jan. hard frozen into the ground that they could not be removed without a hammer.

"One of the *Algæ* was collected in a pool of fresh water, hardly two spans across, and sheltered by a projecting rock that faced the north. The surface of the water was slightly coated with a steel-blue scum: the earth at bottom, perhaps half an inch below, was hard frozen; and the water itself just thawing, for it was an unusually warm day, the thermometer standing at 40°. *Collema crispum*, a British plant, grew on the borders of this pool, and with it a green microscopic *Conferva.*

"A small and beautiful undescribed *lichen* (*Lecanora Daltoni*) occurred very sparingly on the rocks: it is allied to *L. chrysoleuca* of the Swiss Alps. The other plants of this order were exceedingly inconspicuous, and only discoverable by carefully examining the surface of the rocks.

"The sea-weeds gathered on the shores of Cockburn Island were all floating, and carried along by a strong current, loaded with masses of ice.

"Vegetation could not be traced above the conspicuous ledge of rocks, with which the whole island is girt, at fourteen hundred feet elevation. The *lichens* ascended the highest. The singular nature of this flora must be viewed in connexion with the soil and climate; than which perhaps none can be more unfriendly to vegetable life. The form of the island admits of no shelter: its rocks are volcanic, and very hard, sometimes compact, but more frequently vesicular. A steep stony

bank descends from the above-mentioned ledge to the beach; and to it the plants are almost limited. The slope itself is covered with loose fragments of rock, the débris of the cliff above, further broken up by frost, and ice-bound to a depth which there was no opportunity of ascertaining; for on the day the island was visited, the superficial masses alone were slightly loosened by the sun's rays. Thus the plants are confined to an almost incessantly frozen locality, and a particularly barren soil, liable to shift at every partial thaw. During nearly the entire year, even during the summer weeks which the Expedition spent in sight of Cockburn Island, it was constantly covered with snow. Fortunately the ships occupied a position that permitted of landing, on almost the only day when it was practicable to form a collection. The vegetation of so low a degree of latitude might be supposed to remain torpid, except for a few days in the year; when if the warmth were genial, and a short period of growing weather took place, the plants would receive an extraordinary stimulus. But far from such being the case, the effect of the sun's rays, when they momentarily appear, is only prejudicial to vegetation. The black and porous stones quickly part with their moisture; and the *Lecanora* and *Ulva* consequently become so crisp and parched, that they crumble into fragments when an attempt is made to remove them. 1843. Jan

"The conducting power of the minerals in

1843. Jan.

Cockburn Island is too feeble to melt the ice immediately beneath them; and the air was so dry during our visit, that Daniell's Hygrometer, placed hardly six inches above the ice and on the stones, indicated twenty-two degrees of difference on one occasion; and upon another, it fell from 40° to 13°, without producing any condensation. Such dryness is eminently injurious to all vegetables but *lichens*, which, in many cases, seem to thrive best under excessive atmospheric changes. The preponderance of the *Lecanora* in Cockburn Island cannot arise from this exsiccation stimulating its growth; but may be caused by the reaction that takes place afterwards, on the rapid condensation of vapour previously heated by the temperature of the rocks upon which it grows."

Our observations place this island in latitude 64° 12′ S., longitude 59° 49′ W. The tide was falling during the whole time we were on shore, and it was low water at apparent noon; the stream setting out of the inlet to the northward; and judging from the well defined high-water mark, the amount of rise and fall was not more than six feet. The observations were made on a beach, near the north point of the island. This beach is probably the favourite resort of the fur seals at the proper season of the year, and is admirably adapted to their wants. Besides penguins and cormorants innumerable, we found the beautiful white petrel building its nest in the precipitous cliffs, above the

débris which covers the sides and shores of the 1843. island, to the height of fourteen hundred feet from Jan. the beach. The eggs of this bird, which have never before been seen, are 2·2 inches long, 1·6 inch broad, and weigh from six hundred to seven hundred and fifty grains; they are of a bluish white colour, and only one egg, with the young in a forward state, was found in each nest, which was formed of a few feathers on the bare rock: the young birds are of a deep lead colour.

We returned to the ships at noon, and soon afterwards the flood tide from the northward came in so strong that, notwithstanding the assistance of a light wind and our boats a-head towing, it carried us between Cockburn Island and the main Jan. 6. land, some distance up the inlet; but as the channel appeared free from rocks, and there was very little ice about, it gave us no uneasiness; and the tide turning in our favour about 8 P. M., carried us out again. This arm of the sea is terminated at about twenty miles from its entrance by a glacier, which seems to connect the opposite shores; beneath this, as in the fiords of Greenland, it is not improbable its waters unite with those of the ocean to the southward. The inlet was named Admiralty Inlet; its western cape, a high, precipitous promontory, Cape Gage, after Vice-Admiral Sir William Hall Gage, G.C.H.; and its eastern headland, Cape Seymour, after Rear-Admiral Sir George Francis Seymour, Knight, C.B., G.C.H.; the north cape of an extensive bay

1843. Jan. 6. to the north-west was called Cape Gordon, after Captain the Honourable William Gordon, R.N.; and another, still further to the northward, with a high islet off it, Cape Corry, after the Right Honourable Thomas Lowry Corry; the Lords Commissioners of the Admiralty. The deep bay between Cape Gage and Cape Gordon was named after the Honourable Sidney Herbert, M.P., First Secretary to the Admiralty; and a conspicuous headland to the southward of Cape Gage was called Cape Hamilton, after Captain W. A. B. Hamilton, R.N., Private Secretary to the Earl of Haddington, and now Second Secretary to the Admiralty.

The south-west land of Admiralty Inlet, for about ten miles from Cape Seymour, is formed of deep brown-coloured lava, with a polished surface, contorted, and grooved in so extraordinary a manner, as to give it the appearance of having been marked by machinery in numerous series of lines, somewhat resembling the engine turning of a watch-case, but more irregular. It is a narrow slip of land; and at one part, where the icy covering begins, there is either a low connecting neck of land or a narrow channel through it: this we could not determine. The snow-covered land rises gradually to the southward, to an elevation of about two thousand feet, without any rock projecting through it. It was named Snow Hill.

The western coast of Admiralty Inlet is formed of perpendicular cliffs of basaltic rock, which were perfectly free from land ice, except in one or two

places to the northward of Cape Gage, where glaciers fill the valleys and project into the sea. 1843.

Between Cape Purvis and Cape Corry land was indistinctly visible; but Mount Percy, at a distance of sixty miles, formed a conspicuous and beautiful object.

At 11 P.M. we rounded Cape Seymour, and bore away before a fresh breeze to the S.S.W., between a continuous line of grounded bergs and the land, the channel being about two miles broad.

At 3 A.M., after a run of eight leagues, the main pack was seen so close in with the land as to deter me from pushing the ships in between them whilst the wind was blowing from the northward. We therefore hauled off on the port tack, to await a more favourable opportunity, which soon afterwards occurred; the wind at 7. 30. suddenly shifting to the W.S.W., opened a passage between the pack and the land. We then beat along the coast, which at this part is formed of vertical icy cliffs, no part exceeding fifty, and in some places not twenty feet high, the continuation of the covering of Snow Hill, which on this side descends with a gradual slope to the sea, and, as on its southern side, without the smallest rock appearing through its brilliant surface. At noon we were in latitude 64° 34′ S., longitude 57° 10′ W., magnetic dip 63° 7′ S., variation 23° 20′ E. From this position we observed the land, or rather icy cliffs, turn suddenly away to the westward; and the fixed land ice attached to them extended in a deep Jan. 7.

1843. bight round to the south-east as far as we could see; a very great number of bergs were clustered together in the fixed ice, of unusually large size; several of them measuring four or five miles in diameter, and about two hundred feet high, must have broken away from some loftier barrier than we have yet seen in this vicinity. As we advanced to the southward, two high rugged bluff capes at a great distance appeared, bearing W.S.W. (true); the nearest of them I named, at the request of Captain Crozier, after his friend Captain Nicholas Lockyer, R.N. C.B., and the westernmost in memory of our lamented shipmate the late Captain Foster, R.N.

At 2. 30. P.M. when a quarter of a mile from the cliffs, we sounded in fifty-four fathoms, green sand and small black stones; and the rest of the day we continued to work our way amongst the bergs and loose ice towards the fixed land ice, with the intention of getting hold of it.

Jan. 8. The wind shifting to the eastward at 3 A.M., brought with it a thick fog; and, surrounded as we were by innumerable bergs aground in from eighty to one hundred fathoms, and frequently entangled amongst the loose ice, with the tide sweeping us in amongst them, we had great difficulty in avoiding collision with the bergs, and our situation was throughout the day most anxious and embarrassing. A calm succeeded, and, with the boats, we towed out to the south-east, closely followed by the Terror, and before midnight we had the

satisfaction to find that we had passed through 1843.
the chain of bergs into a more clear space, but with a great quantity of loose ice about, which we soon afterwards found to be rapidly closing; as we could not see to any distance, owing to the dense fog, we made fast to a large floe, at 6. 20. A.M.: on the fog clearing away shortly be- Jan. 9.
fore noon, we found ourselves completely beset by the close pack, and fast to the fixed land ice. At noon, in latitude 64° 44′ S., longitude 56° 53′ W., we sounded in one hundred and sixty-four fathoms, green sand; the nearest point of the land bearing north-west by north (true), distant thirteen miles. From the mast-head the land ice extended as far as we could see to the eastward, round by south to north-west.

During the remainder of this and the whole of Jan. 10.
the following day, we were stationary; and, as a light easterly wind with thick snow prevailed on the morning of the 11th, it was not until 10 A.M. Jan. 11.
that we cast off from the land ice; and, coasting along its edge to the westward, we passed again through the cluster of grounded bergs; and, having traced the ice in one unbroken line for nearly thirty miles, before midnight we found it to turn suddenly to the north, and join the icy cliffs at the foot of Snow Hill. Cape Foster, at the distance of Jan. 12.
eight leagues, formed the extreme point of land in sight, and the whole intervening space was one continuous sheet of fixed ice, in which many large bergs were enclosed. There is a bay or inlet,

1843. filled with a glacier, between Cape Foster and Cape Lockyer, and another between Cape Lockyer and the Snow Hill cliffs: this latter cannot be more than five or six miles from the head of Admiralty Inlet. As it was impossible to continue the examination of the land to the westward, or to make any way to the southward, I resolved to lose no more time in this perplexing navigation, but endeavour to trace the land ice to the south-eastward as far as it should lead us; in order to do this it was necessary to extricate ourselves from the loose ice which had now packed so closely in amongst the bergs, that we could see no way out, and the temperature falling to 23° at night, began to connect them into extensive floes, threatening to detain us in our present awkward position for the winter.

At noon, in latitude 64° 39′ S., longitude 57° 24′ W., magnetic dip 63° 20′ S., and variation 23° E., we sounded in one hundred and twenty fathoms, on green mud, close to the edge of the land ice, on which I obtained observations in the evening. On examining the state of the ice to the eastward, we found every channel between the bergs so closed up by large floes, as effectually to prevent our egress: we were therefore obliged to keep the ships sailing to and fro in a small hole of water between the bergs and the land the whole of this and the

Jan. 13. following day, in the course of which we were frequently beset for a few hours, and being carried by the spring tides with great force amongst the bergs, we at times sustained severe shocks.

The main pack continuing to press against the grounded bergs, precluding all chance of our escape, I determined to run the ships into the ice, and endeavour to heave them through it; for the hole of water in which we were shut up, was so completely covered with young ice, I began to have serious apprehensions of the ships being frozen in; and both Captain Crozier and Commander Bird agreed with me in the necessity of the measure. The wind also favouring our intention, we entered the pack at 1. 15. P.M., and continued warping, heaving, and boring through it until 9 P.M., when it became so close that we could not move them another inch. When the tide turned, the ice slackened a little, and our labours were renewed; and being calm in the afternoon of the next day we made encouraging progress, but at 9 P. M. the ice as far as we could see was most closely packed; and its pressure against the land was so great as to heel our ships over considerably and make their timbers crack. 1843. Jan. 14. Jan. 15.

We remained closely beset, and sustaining severe pressure until 4 P.M. on the 16th, when the floe to which we were fast, striking against a grounded berg, broke up into many pieces, by one of which the Terror was carried off to a distance of several miles from us without our being able to move the ships their own length, the tide sweeping us away in different directions, and thick weather succeeding, we lost sight of her for some hours. Jan. 16.

1843. Jan. 17. At 2. 30. A.M. the ice slackening with the turn of the tide, we cast off and rejoined the Terror with very little difficulty: we then made some way to the north-east, but were soon again closely beset, and obliged to make fast to a floe, which, together with the whole body of ice, was drifting with the tide back to the southward: fortunately, in this instance it was stopped by a grounded berg, whilst the rest of the pack continued its progress with much rapidity, and occasionally produced very considerable pressure; but before the tide was done, the clear water to the northward was seen over the pack. At noon we were in latitude 64° 22′ S., longitude 56° 43′ W., in twenty-five fathoms water, distant about four or five miles from the land, Cape Seymour bearing N.N.E. distant nine miles. At 2 P.M. the ice began to drift back to the northward, and to stream off soon afterwards. We now cast off, and made all sail before a strong south-west breeze and after four hours warping and boring through the ice, we effected our escape, and got into clear water. Our people had been so much harassed night and day for the whole of the last week, that being before midnight in comparatively comfortable circumstances, I put the ship under easy sail, which admitted of all hands obtaining a few hours' peaceful rest, which they greatly needed.

Jan. 18. At 2 A.M., whilst standing to the eastward, we came in with the edge of the main pack, very close and consisting of heavy floes, of from one to five miles in diameter; we bore away along it to look

for an opening, but it led us far to the northward, so that at noon we were in latitude 63° 59′ S., longitude 54° 35′ W., magnetic dip 62° 53′, variation 20° 15′ E. At 2. 15. P.M., whilst waiting for the Terror, which had been caught between two floes, we sounded in two hundred and ten fathoms, on green mud, the temperature at 150 fathoms being 30°, that at the surface 32°. 1843.

The pack still trending to the northward, deterred me from following it any farther, and determined me to enter it, and try to force the ships through, to the east extreme of the fixed land ice, to which we were fast on the 9th; as the open state of the pack at this part gave me considerable hope of success. But after exhausting the whole of the next week in the arduous and hazardous struggle, we found ourselves still far short of our position on the 4th instant; being at noon the 24th in latitude 64° 24′ S., and longitude 55° 11′ W., Jan. 24. magnetic dip 63° 4′, in one hundred and eighty-five fathoms soundings, on green sand; and notwithstanding the unremitting and strenuous exertions of officers and men, we were unable to get any further to the southward, the pack carrying us back with it to the northward faster than we could warp or work through it; nevertheless, we continued our endeavours until the end of the month, Jan. 31. fruitless as they proved to be, for on that day our latitude was reduced to 64° 0′ S., the longitude being 55° 18′ W., the magnetic dip 62° 42′ S., and the variation 22° 8′ E. Cockburn Island at a dis-

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—JANUARY, 1843.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.		Rain in Gauge.
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in Shade.	Dew point.	
	° ′	° ′	°	°	°	°	°	°	Inches.
1	64 14	55 54	35	29	31·7	32·5	32	29	—
2	64 28	56 11	39	29·5	33·5	32·6	36	32	—
3	64 22	55 26	34·5	31·5	33·2	33	34	33	—
4	64 35	55 41	38	30·5	33·4	32·9	33	31·5	—
5	64 11	55 57	38	33	35	33·1	35	32·5	—
6	64 12	56 49	45	31	36·6	32·3	37·5	23	—
7	64 34	57 10	35	31	33	31·2	32	30	—
8	64 35	57 27	33	29·5	31	30·8	32	30	—
9	64 44	56 53	36	29	31·8	31	34	29	0·07
10	64 43	56 50	37	31	33·3	31·5	34	29	—
11	64 42	57 6	35	27·5	31	30·9	33	31	0·01
12	64 40	57 56	32·5	25	28·4	29·9	29	27	—
13	64 35	57 23	32	24	27·9	29·4	25·5	20	—
14	64 33	57 24	34·5	24·5	29·2	30·6	34	24	0·01
15	64 32	56 53	35	23·5	30·5	30·6	34·5	24	—
16	64 28	56 51	40	28	31·9	30·6	35	28	0·06
17	64 22	56 43	36	28·5	30·5	30·7	33	27	0·01
18	63 58	54 35	30	26·5	28·3	31·7	30	24·5	—
19	64 22	54 32	30	25	27·2	30·4	27	25·5	0·04
20	64 18	55 42	30	24	26·5	30·9	26	23·5	—
21	64 19	55 56	29	25	26·4	31·2	27	23	0·02
22	64 12	56 10	32·5	25	29·6	30·9	31	20	—
23	64 28	55 47	33·5	30	31·5	32·0	32	31	—
24	64 24	55 11	33·5	29·5	31·3	32·0	31	31*	0·06
25	64 15	56 0	28·5	26·5	27·6	30·8	29	24	—
26	64 4	55 48	30·5	25·5	27·3	30·6	27	23	—
27	64 9	55 51	33	25	28·6	30·3	32	24·5	—
28	64 8	55 51	33·5	27·5	30·6	30·6	31·5	27	—
29	64 5	55 54	39	29·5	33·5	31·7	34	28	—
30	64 9	56 3	36·5	29·5	32·9	31·7	32·5	30	—
31	64 0	55 18	39	33	35·6	32·3	35	31	—
			45	23·5	30·93	31·31			0·28

* Deposit of rain, snow, or fog.

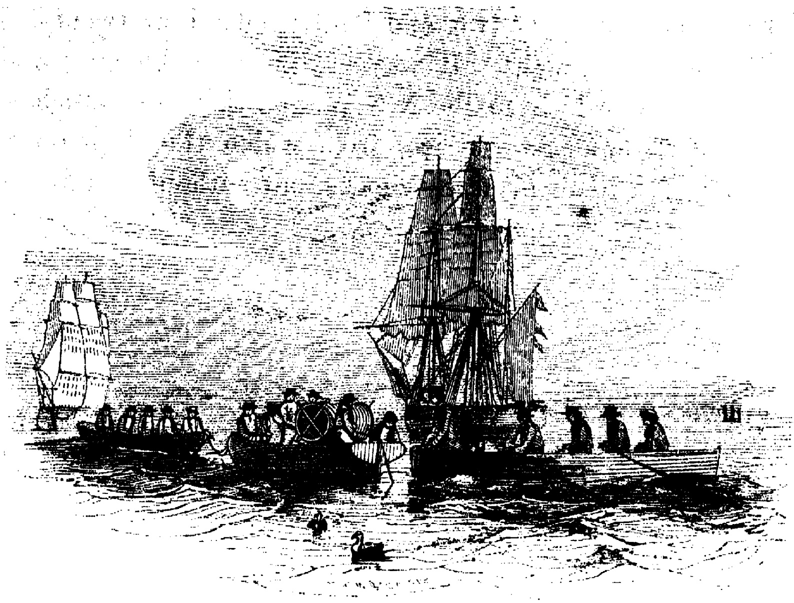
ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—JANUARY, 1843.

1843.

Day.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·238	29·145	29·198	A.M. Westerly P.M. Easterly.	2 1	4 b.c.*
2	·220	28·937	·077	N.E. by N.	3	3 b.c.g.
3	28·937	·638	28·738	N. Westerly	6	0 g.p.s.
4	29·088	·675	·886	Westerly	2	3 b.c.g.
5	·007	·838	·919	North	3	2 b.c.g.
6	28·979	·811	·924	A.M. S.S.W. P.M. N.N.W.	2	4 b.c.v.
7	·829	·635	·725	A.M. N.W. P.M. S.W. by W	4 2	1 b.c.g.p.s. 0 g.
8	·902	·768	·839	E.N.E.	2	0 f.
9	·979	·817	·923	A.M. S.W. P.M. N.Eastly.	3 1	0 f.p.s. 1 b.c.g.
10	·918	·876	·892	S. Easterly	1	0 g.f.p.s.
11	·923	·830	·867	A.M. East P.M. S.W.	1 4	0 g.s.
12	29·069	·926	·989	S.W. by W.	2	0 g.p.s.
13	·108	29·075	29·096	S.W.	2	2 b.c.g.
14	·215	·106	·146	S.W.	3	0 m.g.p.s.
15	·286	·228	·260	A.M. S.S.W. P.M. Easterly	2 1	3 b.c.g.
16	·303	·197	·235	A.M. N.E. P.M. S.E.	2	0 g.p.s.
17	·394	·301	·368	S.S.W.	3	0 g.p.s.
18	·358	·157	·253	S.E.	3	1 b.c.p.s.
19	·157	·075	·109	S.S.E.	3	1 b.c.p.s.
20	·156	·084	·112	South	3	0 g.p.s.
21	·285	·167	·226	S. by W.	3	0 g.p.s.
22	·298	·073	·178	Northerly	3	2 b.c.g.
23	·071	·012	·040	N.N.E.	3	0 m.p.s.
24	·023	28·961	28·990	A.M. N.E. by E. P.M. S.S.W.	3	0 m.s.
25	28·974	·870	·914	S.W by S.	5	0 g.q.
26	29·077	·935	29·020	S.S.W.	4	4 b.c.q.
27	·191	29·043	·138	East	1	1 b.c.g.
28	·528	·206	·351	S. by E.	2	0 g.p.s.
29	·616	·513	·584	A.M. South P.M. N.E.	1	3 b.c.g.
30	·563	·224	·419	N.N.E.	4	3 b.c.m.
31	·219	28·955	·082	N.W.	7	4 b.c.q.m.
	29·616	28·635	29·0838		2·79	

* For explanation of these symbols, see Appendix to Vol. I.

1843. tance of forty-two, and Paulet Island at twenty miles, in sight. It was at this time blowing a strong gale from the N.N.W. and there was much swell amongst the ice, from which the ships received frequent heavy shocks, but without sustaining any serious injury.



Deep Soundings; or, no Bottom with 4600 fathoms. Page 381.

CHAPTER XIII.

Clear the Pack. — Cross the Line of No Variation. — Position of Magnetic Pole. — Enter Antarctic Circle. — Meteorological Abstract for February. — Deep Soundings. — Between Bellinghausen and Weddell's Tracks reach Latitude 71° 30′ S. — Gale at Pack Edge. — Perilous Situation for several Days. — The great Comet. — Recross Antarctic Circle. — Search for Bouvet Island. — Various Accounts of its Position. — Last Iceberg seen. — Circle of Mean Temperature of the Southern Ocean. — Meteorological Abstract for March. — Anchor in Simon's Bay. — Touch at St. Helena and Ascension Islands. — No Soundings with four thousand six hundred Fathoms, the greatest Depth yet reached. — Arrive at Rio. — Sail for England. — Cross the Line of No Dip. — Atmospheric Pressure in the Southern Hemisphere. — Arrive in England.

CHAPTER XIII.

THE period of the season had now arrived at which it became necessary, in order to prevent the ships being frozen into the pack, to give up any further attempt to penetrate it, more especially under the present unfavourable appearances; and, so soon as the gale abated and other circumstances suited, we began to make our way towards the clear water, which the sky indicated was at no great distance to the eastward. This, however, was not accomplished without some days of further labour and difficulty, owing to the thick weather and snow showers preventing our seeing the best leads through the pack. 1843. Feb. 1.

At 6 P.M. on the 4th we got clear of the pack, in latitude 64° 0′, and longitude 54° 0′, with which we had been so fruitlessly contending for a period of nearly six weeks; and truly rejoiced we all felt to be once more bounding freely over the high easterly swell, which the late gale had occasioned. We passed many pieces of heavy loose ice before midnight, but after that time were in perfectly clear water, with the exception of a few small bergs. Feb. 4.

Our object now was to trace the pack edge to the eastward, in the hope that by the time we reached the meridian of 40°, on which Weddell Feb. 5.

1843. penetrated so far to the southward, we also should find the sea there so clear, as to admit of our yet attaining a high latitude: but the weather continuing thick, and a fresh breeze blowing from the east, we made only small progress, beating to windward — the loose ice near the pack edge always gave us timely notice of our approach to it: and the temperature of the sea was another sure guide.

Feb. 6. At noon on the 6th we were in latitude 63° 46′ S., longitude 52° 37′ W., the magnetic dip 62° 08′ S.; and at 1 P.M. we struck soundings in four hundred and eighty fathoms, on fine green sand. The birds were of the same kinds that I have so often enumerated as being found near the pack edge; seals were numerous, and one that we killed measured twelve feet two inches, and weighed 1145 lbs.

Beating to the eastward, along the pack edge, making about thirty miles daily, we were at Feb. 8. noon of the 8th in latitude 63° 49′ S., longitude 51° 07′ W., where we had no soundings with one thousand two hundred and ten fathoms. The temperature at that depth was 39°·5; at 600 fathoms, 37°·3; at 450 fathoms, 36°·4; at 300 fathoms, 35°·5; at 150 fathoms, 33°·2; at 100 fathoms, 32°·2; and at the surface, 32°·; but between the surface and one hundred fathoms the thermometers denoted that they had all passed through a stratum of water of the temperature of 29°·3. The specific gravity at the depth of 450 fathoms being the same as at the surface, 1·0274 at 33°.

Feb. 10. During the next three days we examined about

one hundred and sixty miles of the pack, frequently 1843.
entering the outer edge as far as we could without getting beset, without perceiving any opening in it by which we could penetrate to the south; and at noon, the 11th, were in latitude 64° 37′, and longitude 45° 39′; on the 14th we crossed Weddell's Feb. 14.
track, in latitude 65° 13′ S., but under what different circumstances! he was in a clear sea: we found a dense, impenetrable pack; and as Admiral D'Urville was unable to attain even to the 64th degree, we must conclude that Weddell was favoured by an unusually fine season, and we may rejoice that there was a brave and daring seaman on the spot to profit by the opportunity.

Still pursuing our examination of the pack to the eastward, we crossed the line of no variation on the 22d, in latitude 61° 30′ S., and longitude about Feb. 22.
22° 30′ W., where the magnetic dip being 57° 40′, gives the position of the magnetic pole in remarkable accordance with our previous determination; the circle of equal dip passing through New Zealand, and having the pole exactly half way between us and that place, seems satisfactorily to confirm my previous suggestion, that there is but one pole of verticity in the southern hemisphere, not very distant from the place computed by Gauss, but much more remote from the spot he had assigned to it, and where I was directed to seek for it.* We had no soundings with seven hundred and fifty

* See Appendix, to Vol. II., p. 58.

1843. fathoms, the temperature at that depth being 39°·2, that of the surface, 32°; we found the current setting N.60° E. ten miles per diem.

From this point the pack trended more to the
Feb. 26. southward of east, so that by noon the 26th we were in latitude 64° 38′ S., and longitude 12° W. the dip 60° 50′ S., and variation 6° W. It was blowing strong from the north-east, with a heavy swell and a thick fog, which obliged us to keep a good offing from the pack, under our lee.
Feb. 27. Throughout the whole of the next day the snow was so thick that we could not see half a mile before us, and had great difficulty in keeping the ships together, especially in passing through a cluster of large bergs, shortly before dark: we had afterwards long intervals of clearer weather between the snow showers; and even derived considerable assistance from diffused auroral light, which appeared from south-west to south-east, in small patches.

Feb. 28. When day broke we made all sail, anxious to take advantage of the fine clear sea in which we were navigating. The pack, having suddenly turned off to the southward, could not now be seen; and we began to hope we had reached its eastern limits. Steering to the south-east, we crossed the 66th degree of latitude, in 7° west longitude, shortly before noon, when the wind veered round to the south-eastward; and being within one hundred miles of the route by which the Russian navigator, Bellinghausen, in January, 1820, reached the latitude of 69°¾ S., in 2° west longi-

tude, and being assured that no considerable portion of land could lie between our tracks, I considered it would be a waste of time to follow his footsteps up to that latitude, should it even at this late period of the season prove attainable; I therefore preferred devoting the few remaining days of the navigable season to exploring between those meridians upon which we had been permitted to carry our researches so many degrees to the southward of any of our predecessors. We accordingly tacked at 3 P.M., and stood to the south-west. Thick weather prevailed throughout the rest of the day and greater part of the night, during which we saw only a few pieces of ice and no bergs, which gave us the more confidence in carrying sail, a rather hazardous proceeding, which nothing but the urgency of the case could justify; and daylight again appeared without our having occasion to regret having adopted it. 1843.

Between 2 and 3 A.M. we entered the Antarctic circle, only three days earlier than we had crossed it in former seasons, returning from our more successful operations. We tried for, but did not obtain, soundings, with four hundred and fifty fathoms, and there was so much swell that our experiments on the temperature failed. Several whales, sooty albatross, Cape pigeons, blue petrel, and two or three white petrel were seen in the course of the day. We also observed that the colour of the sea had changed from its beautiful March 1.

1843.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—FEBRUARY, 1843.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temp. at 9 A.M.	
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in shade.	Dew point.
	° ′	° ′	°	°	°	°	°	°
1	63 59	55 20	35	29·5	32·1	32·0	29	29*
2	64 16	55 22	33·5	28·5	31·5	31·5	32·5	26
3	64 17	55 40	29·5	27·5	28·6	30·8	28	27
4	64 10	54 47	31	26	29·0	30·7	29	24
5	63 30	53 01	32	30	31·1	32·2	32	28
6	63 46	52 37	32	30	31·1	31·9	31·5	29
7	64 08	51 53	32·5	30	31·6	31·7	32	32*
8	63 49	51 07	35·5	31	33·0	32·6	33	33*
9	64 19	50 24	35·5	30·5	32·0	31·6	35	31
10	64 31	47 44	32·5	30	30·9	30·1	31	27·5
11	64 37	45 39	31	28	30·0	30·1	30	28·5
12	64 39	43 56	31·5	28	29·7	29·7	30	25·5
13	64 56	42 59	32·5	29·5	30·8	30·1	30	30*
14	65 06	41 14	35·5	30	31·7	30·3	33	30
15	64 40	39 28	30	28	29·5	30·2	30	26
16	63 56	38 17	30	28	28·7	29·6	29	25
17	63 36	35 24	29·5	27·5	28·6	29·1	28·5	26
18	62 39	31 44	32	28·5	30·4	30·2	31	30
19	62 16	29 00	30·5	28	29·2	29·6	29·5	25
20	61 59	26 17	32	28	30·1	30·1	32	32*
21	61 51	24 00	32	29	29·5	30·1	29	29*
22	61 37	21 51	31·5	29·5	30·0	30·1	30	21
23	61 46	18 58	30·5	28	28·9	30·7	29	29*
24	62 36	15 52	31	27·5	28·8	30·4	30·5	26
25	64 10	14 19	32	29·5	31·3	31·0	32	32*
26	64 38	12 00	35	32	32·6	31·8	33	33*
27	65 12	9 55	33	32	32·4	32·0	32	32*
28	66 01	6 53	34	32	32·5	32·5	33	33*
			35·5	27·5	30·56	30·88		

* Deposit of rain, snow, or fog.

ABSTRACT OF THE METEOROLOGICAL JOURNAL KEPT ON BOARD HER MAJESTY'S SHIP EREBUS.—FEBRUARY, 1843.

Day.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·310	28·952	29·107	S. Westerly	4	1 b.c.p.s.q. *
2	·593	29·321	·497	A.M. S.S.W. P.M. East.	3 2	0 m.s.
3	·597	·508	·545	East	5	0 l.s.
4	·495	·339	·403	S.E.E.	4	0 p.s.
5	·338	·163	·244	E.S.E.	5	A.M. 1 b.c.g. P.M. 0 s.q.
6	·304	·228	·264	E.N.	3	0 m.f.p.s.
7	·373	·263	·320	East	2	0 m.s.f.
8	·456	·356	·392	N.Easterly	2	0 m.f.
9	·495	·450	·476	N.E.	2	A.M. 1 b.c.o.g.
10	·451	·228	·360	North	2	0 g.p.s.
11	·190	28·961	·041	Easterly	4	0 g.p.s.
12	·199	·988	·064	S.E. by E.	3	1 b c.p.s.
13	·470	29·217	·334	E.N.E.	2	1 b.c.p.s
14	·512	·389	·478	N.Easterly	2	1 b.c.g.p.s.
15	·371	·148	·247	East	5	0 g.p.s.
16	·283	·160	·210	S.Easterly	4	2 b.c.g.q.p.s.
17	·362	·268	·337	S.S.E.	4	0 g.p.s.
18	·295	·182	·217	S.E.	3	0 g.p.s.
19	·253	·225	·236	South	4	0 g.p.s.
20	·377	·255	·311	Easterly	2	0 f.s.
21	·527	·342	·404	S.S.E.	4	0 g.p.s.
22	·637	·545	·553	Southerly	2	0
23	·599	·486	·543	S.W.	4	0 g.q.p s.
24	·702	·527	·651	S.W. by W.	4	0 g.
25	·491	28·614	·010	North	6	0 g.m.q.p.s.
26	28·604	·435	28·504	N. by E.	3	0 m.f.p.r.s.
27	·716	·481	·614	S.S.W.	2	0 p s.
28	·958	·712	·830	Southerly.	4	0 m.s.
	29·702	28·435	29·2568		3·34	

* For explanation of these symbols, see Appendix to Vol. I.

1843. oceanic blue to a light olive brown. At noon we were in latitude 67° 6′ S., longitude 9° W., magnetic dip 62° 42′ S., variation 8° 12′ W. The evening was fine, and with a fresh breeze from S.E. we made good progress to the S.W., passing only a few bergs and some straggling pieces of ice. The stars shone with great brilliancy during the night, a sight we had not witnessed for a long time, having been obscured during the last month by almost continual fog and snow; indeed, there were only three days in which we were not assailed by snow showers.

March 2. Beautiful as had been the night, the morning broke still more splendidly; the sun rose out of the horizon bright and clear; and as the day advanced the effects of his rays, feeble as they were, from their obliquity, had an animating influence on us all who had not seen his unclouded face for a space of nearly six weeks. It afforded me the opportunity I had long desired, of obtaining actinometric observations, in which, with the assistance of Commander Bird, I succeeded, and completed two sets of experiments with each of two different instruments; by which the absolute value of the sun's radiating power in these latitudes can be accurately determined.

At noon our latitude was 68° 14′ S., longitude 12° 20′ W., magnetic dip 63° 28′ S., and variation 6° 3′ W. Numerous fragments of bergs were passed, from which we might have replenished our almost exhausted store of water, but the sea was

running so high, although there was only little wind, that I could not venture to lower the boats. 1843.

At 3 P.M. clouds rose slowly from the eastward, and concealed from our view the blue vault of heaven, excepting only a space of about twenty degrees, in which the sun went down more gorgeously than he arose.

Light baffling winds continued throughout the evening, greatly retarding our progress at a time when every hour was of importance, and it required much reflection upon past mercies to prevent a feeling of impatience at the delay arising in our minds.

The sky had become darkened by dense snow clouds; and the threatening appearance to the N.E. led us to expect that unfavourable weather would follow, but in this we were mistaken. After a gentle air from the S. W., which dispersed the March 3
clouds, it fell perfectly calm; and the swell having subsided, the boats were lowered to try for soundings. Owing to our having always struck ground in less than two thousand fathoms in other parts of the Antarctic ocean, we, unfortunately, had only four thousand fathoms of line prepared, the whole of which ran off the reel without reaching the bottom. The temperature at 1050 fathoms was 39°·5; at 900 fathoms, 39°·; at 750 fathoms, 39°·4; at 600 fathoms, 38°·7; at 300 fathoms, 35°·5; at 150 fathoms, 33°·; and at the surface, 30°.8. The specific gravity at 150 and 600 fathoms was 1·0283 at 38°; and of the surface, 1·0278 at 32°.

1843. The current was setting to the S.W. at the rate of seven miles daily.

We were at this time in latitude 68° 34′ S., longitude 12° 49′ W., magnetic dip 63° 24′ S., and variation 5° 24′ W.

The great depth of the ocean served to relieve us from every apprehension of being obstructed by land, and at the same time to inspire a hope that we might still find a clear sea very far to the south, for Davis has shrewdly observed, "the deep sea fryseth not;" the cause of which we now find in the constant supply of heat from beneath; although the period of the year had arrived, when our former experience had led us to consider the higher southern latitudes as sealed from the intrusion of man.

A light wind sprang up at 4. 30. P.M., from the westward, which increased to a fresh breeze from the north-west before midnight, and we carried all sail, steering south-west; the sky was overcast, but we could see to the distance of five or six miles after

March 4. day broke. At noon our latitude was 69° 27′ S., longitude 14° 29′ W., magnetic dip 64° 5′. In the afternoon it became more clear; the sun broke through the clouds, and we got observations for the variation, of great interest as they enabled us to trace the line of no variation to the southward. At 6 P.M. we had passed the highest latitude attained by Bellinghausen, about midway between his track and Weddell's; and at 9 P.M. we crossed the 70th degree of latitude.

Snow showers now became frequent, and many bergs were seen; the white petrel also appeared in great numbers, indicating our approach to the pack; but we pursued our course under all sail, the night being fine and the sea smooth. 1843.

In the morning we had constant snow and hazy weather; and at 8. 30. A.M., whilst running with all studding sails set, the main pack was seen from S.W. by S. to W.N.W. We immediately shortened sail and altered the course, at first to south, and then to S.E., running along from point to point of the pack. At noon our latitude was 71° 10′ S., longitude 15° 47′ W., at which time we were passing much loose ice off the pack edge, which now extended from east, round by south to W.N.W., so that we could not proceed further south without entering it. The outer edge appearing very open from the mast-head, we ran the ships into it as far as we prudently could; and at four o'clock, after penetrating about twenty-seven miles, we found it so close and heavy, and the holes of water amongst it so covered with newly formed ice, that we were obliged to haul to the wind, and endeavour to work our way out again, which we had some difficulty in doing, as the wind had freshened considerably, and was blowing directly on to the pack. When at our farthest we were in latitude 71° 30′ S., longitude 14° 51′ W.: a cask was then thrown overboard, containing a paper signed by myself and all the officers, stating the fact. March 5.

1843. The barometer falling rapidly, indicated an approaching gale; and with the pack under our lee, we were obliged to carry all sail, to gain an offing as speedily as possible. The season was now too far advanced to attempt any further examination of the pack, therefore I made the signal to the Terror of my intention to proceed to the Cape of Good Hope; and having hoisted our colours, we began to retrace our steps, and before dark regained the clear water. Here we found the gale blowing in violent squalls, attended with constant snow; and, notwithstanding the great hazard of doing so, amongst the numerous bergs that surrounded us, we were obliged to carry a heavy press of sail throughout the night; after all, we were scarcely
March 6. able to hold our ground, for at daylight the pack was seen through the haze and thick snow, at about a quarter of a mile from us, under our lee, presenting to view a line of foaming breakers. We immediately wore to the eastward; the gale increasing, and the sea running very high, we endeavoured to beat off under treble-reefed topsails and reefed courses; but again the pack appeared a-head and to leeward in the evening, proving to us that we were completely embayed. Fortunately, the gale was driving the pack before it, at about the same rate that we were dropping down upon it. We wore and stood to the eastward, under all the sail we could possibly carry; our masts, though aided by additional supports, quivered to every sea that broke over the ship, and the

sprays freezing as they fell upon the rigging and decks, rendered it difficult to work the ropes, while the extreme darkness of the night kept us in continual apprehension of collision with some of the bergs which at times it seemed almost impossible to avoid. 1843.

I need not say it was a night of deep anxiety to us all: and the necessary degree of composure and peace of mind required to meet it, could only result from a firm reliance upon the guidance and protection of Almighty God, who had preserved us under equally perilous circumstances.

Throughout this fearful night and the whole of the next day, we could not perceive the least mitigation of the gale; but it favoured us by veering rather more to the eastward; soon after dark, when we were preparing to pass another anxious night, the wind suddenly abated, and at midnight we had a light air from the westward. A calm of six hours' duration succeeded; after which the north-east wind came on with scarcely less fury than before; but by our observations we found we had gained some ground, and had no longer any dread of being driven down upon the pack. At noon our latitude was 70° 28′ S., longitude 17° 21′ W., magnetic dip 65° 1′ S., variation 0°·16′ W. Our only remaining difficulty now, was to avoid the bergs with which, as during the former gale, we were several times nearly in collision; the heavy sea which broke against the perpendicular face of one of them fell on board our

March 7.

March 8.

1843. ship. Too much praise cannot be bestowed upon Captain Crozier and his officers, for the seamanlike manner in which the Terror was conducted and maintained her station throughout these severe gales; and the vigilance, activity, and cool courage displayed by Commander Bird, and the rest of my companions, deserve the expression of my high admiration.

March 9. By daylight the next morning the wind had veered to the E. S. E., but the heavy swell occasioned by the N. E. gale prevented our making such good way in that direction as we otherwise should have done. At noon our latitude was 69° 38′ S., longitude 15° 43′ W.

The whole of the rest of the day and during the night the storm still raged, and kept us anxiously on the look out to avoid the bergs; and it can never cease to be a source of wonder and gratitude that we escaped running against them.

March 10. We kept under easy sail during the night; but as soon as day broke we set all that the ships could carry, steering to the north-east. The wind moderated towards noon, and the fine day which followed was one of real enjoyment, after the almost uninterrupted succession of gales and thick weather we had experienced during the past week.

At 9 P.M. a remarkable ray of light was seen between two dark clouds; it was mentioned in the log-book as a stationary beam of Aurora Australis, bearing west, and inclined in an angle of about 45° to the southward. It was seen frequently

during the few following nights, and its fixed character at length assured us that it must be the tail of a comet, which eventually proved to be the case. It was seen a few days sooner than by us at the Cape of Good Hope, St. Helena, and Barbadoes; but not until the 17th of March in Europe, where Sir John Herschel published the earliest notice of it, designating it as a "Comet of enormous magnitude in the course of its progress through our system, and at present not far from its perihelion." 1843.

At 6. 30. A.M. we recrossed the Antarctic circle for the last time, in longitude 13° 30′ W., and by noon were in latitude 65° 56′ S., and longitude 13° 36′ W., having made good a course of N. 17° E., one hundred and thirty-six miles, since noon of yesterday. March 11.

As we must necessarily pass near Bouvet Island, which has been so frequently sought in vain, our course was shaped so as to get into its supposed latitude at about ten degrees to the westward, that we might, by sailing to the eastward on that parallel, ascertain its position with some degree of precision. We had a succession of strong S.W. gales, and passed a great number of bergs, which obliged us to proceed under reduced sail during the long dark nights of this late season of the year.

On the 15th and 18th, we had opportunities of trying the temperature of the sea, which we found at 600 fathoms to be 39°; at 450 fathoms, 37°·8; at 300 fathoms, 36°·8; at 150 fathoms, 35°·2; at March 18.

1843. the surface 33°.5; in both cases the mean latitude being 56° 41′ S., and longitude 6° 5′ W.

March 19. At 6 P.M. the following day, being in the latitude of Bouvet Island, 54° 21′ S., and about three hundred miles west of its assigned position, our course was altered to true east; the number of bergs had greatly diminished, and having fine clear weather, we continued, throughout the night, under all sail.

During the next two days it blew a gale from the N.W., and for the first time we had rain instead of snow, the temperature having risen to 37°. As we were now approaching Bouvet Island, we rounded to every night, lest we should either run upon, or pass it in the dark.

March 20. At noon, the 20th, we crossed the meridian of Greenwich, in latitude 54° 7′ S., and pursuing a true east course, were in longitude 2° 50′ E. the

March 21. next day at noon. Many bergs of large size were seen during the last two days, and were the occasion of frequent false reports of land.

At 8 P.M. we were in latitude 54° 8′ S., and longitude 4° 36′ E.; only fifty-eight miles from the island, as placed on the Admiralty chart. We hove to for the night under a close-reefed main-top-sail, the sea running very high, and many bergs about us. Every two hours we tried for, but did not obtain soundings, with 400 fathoms.

March 22. At daylight we bore away before the gale, which had not abated in the smallest degree, and the sea had gained a mountainous height; the weather, how-

ever, was clear, so that we could see the bergs at a distance of three or four leagues. At noon, by observation, our latitude was 54° 11′ S., and longitude 6° E. Bouvet Island should, therefore, have been in sight, bearing S. 55° E., distant nine miles. We stood exactly for it, until we had run twelve miles, but not seeing it, we steered east, to keep in its supposed latitude: after having gone forty miles further, we arrived at the spot from which Cook sought it to the eastward, and the night getting dark, I gave up all further search, concluding, with him, that M. Bouvet had mistaken a large iceberg for land. I have now, however, reason to believe that there is an island in that vicinity; for since my return to England, I have learned from C. Enderby, Esq. that it has been visited by several of his vessels, and that a party from one of them actually landed, and was compelled by stormy weather to remain nearly six days on the island, and brought on board several seals, which they had killed on its S.W. point. 1843.

The log-book of the Sprightly, Captain Norris, is now before me, from which I quote the following passages:—"10th December, 1825. The island is in latitude 54° 15′ S., longitude by chronometer 5° E.; and, as we are now certain it is an island, we name it Liverpool Island. It appears to extend three or four leagues from north to south; the north end high and rugged, the south end low, the middle high, and covered with snow."

There is a pencil drawing of the island, bearing

1843. west five or six leagues. The log says, "The captain got within a cable length of the shore, but owing to the steepness of the rocks, and the weather coming on thick, with much sleet and snow, was the whole and sole reason of not making a successful landing."

On the 13th they met with another island, of which is said,—"This island, which we have named Thompson Island, bears about N.N.E., fifteen leagues from Liverpool Island; there are also three rocks, which we named the Chimnies, to the S.W., four or five miles from Thompson Island; and another rock three miles to the southward of them. The island is in latitude 53° 56′ S., longitude 5° 30′ E."

We read, "16th December, P.M., fresh breezes and cloudy. The Lively (the consort of the Sprightly), by order, hoisted out her boat, and we manned her out of both vessels and sent her on shore, to endeavour to find a landing at the west end of the island. We sounded on its south side, and found from thirty-five to twenty fathoms, black sandy bottom, at a mile from the shore. Caught a number of small fish, resembling codfish. At 8 P.M. the boat returned, having hoisted the union jack on the shore, &c.

"On the 18th P.M., the captain gave orders for a boat to be manned from each vessel, one to go one way round the isle and one the other, and to meet at the west end."

Stormy weather almost immediately followed

the landing of the boats, and it was not until the 24th the boats could regain the ships. They brought the skins of forty-eight seals they had killed on the island. And the log says, — "We found by their report that seals are very scarce; and the isle is not likely to produce many, the S. W. point being the only place where they can make a landing, as the boats went entirely round the isle, and nothing but perpendicular rocks could be seen; it bears evident marks of having been a volcano, as it is nothing less than a complete cinder, with immense veins of lava, which have the appearance of black glass, though some are streaked with white." 1843.

Captain James Lindsay, in the Swan sealer, also belonging to Messrs. Enderby, endeavoured to approach an island which they saw in latitude 54° 24′ S., and longitude 3° 15′ E., on the 7th of October, 1808; but after persevering for several days, and running great hazard, they were unable to penetrate the floes and loose ice by which it was surrounded, and abandoned the attempt. His description of the island, as well as the position he assigns it, differs so much from Captain Norris's, that it was certainly not the same as that upon which his people landed. He says, "The west point of the island is high and steep, the east point low and level, covered with snow; it appears about five miles from east to west, and the close ice surrounds it to the distance of three miles from its shores."

1843. From these statements it would appear that there is probably more than one island in this neighbourhood, but certainly not in the positions given in their log-books; for although unaware of these accounts at the time we were in search of Bouvet Island, we passed so near as certainly to have seen them had they been there. It would be very desirable that their number and situation should be accurately determined, which might easily be done by a small vessel from the Cape of Good Hope. The proper season for this service is the middle of December, when the nights are short, and the finest weather may be expected.

March 25. We continued to experience very boisterous weather, and passed numerous bergs in our passage to the Cape, until noon of the 25th, when we were in latitude 47° 40′ S., longitude 10° 51′ E., magnetic dip 55° 53′ S. and variation 25° 29′ W., where the last iceberg was seen.

March 27. On the 27th, in latitude 43° 52′ S., longitude 13° 23′ E., we found the temperature of the sea at 600 fathoms to be 39°·5; at 450 fathoms, 39°·8; at 300 fathoms, 40°·3; at 150 fathoms, 44°; at the surface 47°·5. We were, therefore, very much to the northward of the circle of uniform temperature of the ocean throughout its entire depth, and must have crossed it in about the latitude of 52°, and longitude 9° E. I very much regretted that the tempestuous weather prevented our making experiments in that locality.

We had previously crossed this circle at the following six different points, viz.: — 1843. March 27.

Date.		Latitude.	Longitude.	Reference to Narrative.
1840. Dec. 21	-	57° 52′ S.	170° 30′ E.	Vol. I. p. 166
1841. March 30	-	55 09	132 20	Vol. I. p. 317
„ Dec. 13	-	55 18	149 20 W.	Vol. II. p. 140
1842. March 23	-	58 36	104 40	Vol. II. p. 227
„ Sept. 16	-	54 41	55 12	„ p. 282
„ Dec. 20	-	55 48	54 40	„ p. 322
Mean Latitude	-	56 14 S., or if we consider the latter two as one point, 56° 26′		

It is, therefore, evident that about this parallel of latitude there is a belt or circle round the earth, where the mean temperature of the sea obtains throughout its entire depth, forming a boundary, or kind of neutral ground, between the two great thermic basins of the ocean. To the north of this circle the sea has become warmer than its mean temperature, by reason of the sun's heat, which it has absorbed, elevating its temperature at various depths in different latitudes. So that the line of mean temperature of 39°·5, in latitude 45° S., has descended to the depth of 600 fathoms; and at the equatorial and tropical regions, this mark of the limit of the sun's influence is found at the depth of about 1200 fathoms; beneath which the ocean maintains its unvarying mean temperature of 39°·5, whilst that of the surface is about 78°.

So likewise to the south of the circle of mean temperature, we find that in the absence of an equal solar supply, the radiation of the heat of the

1843.

ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS.—MARCH, 1843.

Day.	Position at Noon.		Temperature of the Air in Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.	
	Lat. S.	Long. W.	Max.	Min.	Mean.		Air in Shade.	Dew point.
1	67° 06′	8° 35′	32°	25·5°	30·6°	31·8°	31°	26°
2	68 14	12 20	29	26	27·5	30·7	27	18
3	68 34	12 49	30·5	28	29·4	30·6	30	18·5
4	69 26	14 29	31·5	29	30·0	30·7	30	21
5	71 10	15 47	32	29	30·1	30·4	30	30 *
6	71 09	15 39	30	29	30·2	30·4	30	30 *
7	70 36	16 42	30·5	28·5	29·9	30·1	30	30 *
8	70 28	17 21	30·5	27	28·7	30·0	30	30 *
9	69 38	15 43	27·5	25	26·4	30·0	27	27 *
10	68 06	15 20	29	24·5	26·8	30·1	25	22
11	65 56	13 10	30	27·5	28·8	30·6	29	23
12	63 57	13 36	33	29·5	30·8	31·4	32	28
13	61 34	11 23	31	29	29·4	32·3	31	24·5
14	59 16	9 19	31	28	29·4	31·5	30	16
15	57 27	7 52	36	29	30·8	33·0	32	18
16	57 09	7 15	33·5	29	30·6	33·3	31	26
17	56 38	6 16	34	30·5	32·2	33·3	31	30 *
18	55 56	4 19	34	32	33·2	33·5	34	31·5
19	54 31	2 25	34	32	32·8	33·4	33	33 *
20	54 07	0 0	36	32	34·0	33·4	34	20·5
		East.						
21	54 05	2 50	37	33·5	35·5	33·4	37	37 *
22	54 11	6 01	35	32	33·4	33·5	35	35 *
23	52 31	8 08	36	33	34·0	34·3	33	33 *
24	50 18	9 15	38·5	34	37·0	37·3	36	31
25	47 38	10 51	44	38	40·7	41·1	41	38
26	45 32	11 54	47	42	45·0	44·2	44	44
27	43 52	13 23	52·5	47·5	49·8	47·5	50	49
28	43 10	14 44	57	49·5	52·7	50·6	52	50·5
29	41 48	15 09	58	50	52·7	54·5	54	54
30	39 56	15 52	61	51·5	55·3	63·9	55	52
31	37 40	16 40	67	62	64·9	65·2	66	55
			67	24·5	35·57	36·65		

* Deposit of rain, snow, or fog.

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ABSTRACT OF THE METEOROLOGICAL JOURNAL OF HER MAJESTY'S SHIP EREBUS.—MARCH, 1843.

Day.	Barometer.			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·118	28·951	29·016	S.S.E.	4	A.M. 0 p.s.* P.M. 3 b.c.
2	·217	29·089	·173	Southerly	A.M. 3 P.M. 1	4 b.c.
3	·260	·192	·210	A.M. S.S.W. P.M. Nthly.	1	0 g.
4	·285	·228	·264	N.W.	3	0 g.p.s.
5	·213	28·809	·022	N. Easterly	4	0 s.
6	28·885	·742	28·808	N.E.	7	0 q g.p.s.
7	29·098	·798	·897	E. by N.	7	0 q. f. s.
8	·262	29·125	29·200	N.E. by E.	4	0 q.p.s.
9	·253	·053	·148	E. by S.	6	0 q.p.s.
10	·135	·013	·072	S.E.	6	1 b.c.o.p.s.
11	·130	28·520	28·860	East	4	0 p.s.
12	·113	·441	·690	S.S.E.	5	2 b.c.q.p.s.
13	·481	29·122	29·340	S.W.	5	0 g.q.p.s.
14	·558	·460	·499	S.W. by W.	4	0 g.p.s.
15	·653	·473	·637	S. Westerly	2	2 b.c.p.m.
16	·449	·268	·340	N. Easterly	2	A.M. 0 g.p.s. P.M. 3 b.c.
17	·351	·254	·303	N.N.E.	3	0 g.p.s.
18	·365	·142	·270	A.M. N.W. P.M. S.E.	3	0 g.m.p.s.
19	·664	·113	·302	S. by E.	6	0 g.q.p.s.
20	·827	·414	·711	N. Westerly	A.M. 2 P.M. 6	3 b c.g. 0 q.p.s.r.
21	·529	·009	·293	A.M. N.W. P.M. West.	8 9	0 g.q r. 3 b.c.q.p.s.
22	·373	·095	·191	W.N.W.	A.M. 9 P.M. 10	0 g.q.p.s. 1 b.c.q.p.s.m.
23	·699	·118	·415	W. by S.	8	1 b.c.q.s.
24	30·239	·720	30·053	W.S.W.	6	c.q.p.m.
25	·362	30·223	·292	N.W. by W.	6	1 b.c.g.q.
26	·438	·300	·367	N.W.	5	0 g.
27	·429	·368	·392	Northerly	3	2 b.c.m.
28	·390	·323	·355	N.N.W.	3	6 b.c.
29	·403	·334	·361	W.S.W.	3	2 b.c.m.
30	·370	·293	·333	S.E. by S.	3	0 3 b.c.
31	·290	·092	·189	S.E.	6	3 b.c.q.p.r.
	30·438	28·441	29·4840		4·63	

* For explanation of these symbols see Appendix, Vol. I.

1843. March 27. ocean into space occasions the sea to be of a colder temperature as we advance to the south; and near the 70th degree of latitude, we find the line of mean temperature has descended to the depth of 750 fathoms; beneath which again, to the greatest depths, the temperature of 39°·5 obtains, whilst that of the surface is 30°.

This circle of mean temperature of the southern ocean is a standard point in nature, which, if determined with very great accuracy, would afford to philosophers of future ages the means of ascertaining if the globe we inhabit shall have undergone any change of temperature, and to what amount, during the interval.

The experiments which our limited time and means admitted of our making, serve to show that the mean temperature of the ocean at present is about 39°·5, or 7½ degrees above the freezing point of pure water; and as nearly as possible the point of its greatest density. But it would be indispensable that this temperature should be ascertained to the tenth part of a degree; and as we now know where we may send any number of thermometers down to the greatest fathomable depths, without an alteration of temperature, even to that small amount, this desideratum might be very easily obtained.

These observations force upon us the conclusion that the internal heat of the earth exercises no influence upon the temperature of the ocean, or we should not find any part in which it was equable

from the surface to the great depth we have reached; a new and important fact in the physics of our globe. 1843.

On the following day thermometers were sent to the depth of 1200 fathoms, where the temperature was 39°·5; at 1050 fathoms, it was 39°·8; at 450 fathoms, 41°·1; at 300 fathoms, 44°; and at the surface, 53°. The specific gravity from 1050 fathoms, and 450 fathoms, was 1·0269 at 63°; that of the surface being 1·0275 at 53°. We were at this time in latitude 43° 10′ S., longitude 14° 44′ E.; the Cape of Good Hope bearing N.18 E., distant five hundred and fifty-six miles. March 28.

We had favourable winds and fine weather until the 4th of April, when, at 6^h 20^m A.M. the land was reported, and by noon we were close in with Cape Point. The wind blowing fresh, with frequent squalls, directly out of Simon's Bay, we had to beat up, and it was not until 7^h 30^m P.M. that we anchored close to her Majesty's Ship Winchester, bearing the flag of Rear Admiral the Honourable Josceline Percy, C.B. April 4.

Captain Crozier and I immediately waited upon the Commander-in-Chief, by whom we were received in the most kind and gratifying manner; and I had the satisfaction of reporting to him, for the information of the Lords Commissioners of the Admiralty, that the expedition had returned for a third time from the arduous service in which it had been engaged, without a single individual of either of the ships on the sick list.

1843. The refitment of the ships and refreshment of their crews, the repetition of our magnetic experiments, and comparison of our instruments with those of the permanent magnetic observatory, gave us full occupation to the end of the month. During the whole of this time we experienced not only every assistance in forwarding our operations, from the Commander-in-chief, but from himself, Mrs. Percy, and their family the greatest attention and kindness that consideration could suggest. We were also much indebted to Captain Eden, of the flag-ship, and Mr. Thomson, the store-keeper at the dock-yard, for affording us every facility in their power.

April 30. At $8^h\ 30^m$ A.M. on the 30th we weighed, and, being quite calm, towed out of Simon's Bay. A breeze sprang up from the north-west at 10 A.M., and at noon we rounded Cape Point, and stood to the westward under all sail.

We had now turned our backs on the antarctic regions, and had fairly begun our homeward voyage, though we had one object yet to fulfil, which was, to go to Rio de Janeiro for magnetic purposes, touching, on our way, at St. Helena and Ascension.

We arrived at St. Helena on the morning of the
May 13. 13th, and found our old friend, Colonel Trelawney, of the Royal Artillery, now governor of the island. He welcomed us with that kind-hearted hospitality which was natural to him. We have since learned that his family and friends have to regret the loss of this excellent man.

The comparison of our magnetic instruments was completed in a few days, and we sailed again, on the 20th, for the Island of Ascension, and without any events worthy of notice, arrived there on the 25th. Our magnetic experiments, before and after crossing the line of no dip, are of peculiar interest, and will be published with the rest of our magnetic observations, under the supervision of Colonel Sabine. In the Appendix to this volume will be found a table, containing our position at noon every day of the remainder of our voyage, the magnetic dip and variation, and the direction and strength of the current. 1843. May 20.

From Captain Dwyer, of the Royal Marines, commandant of the island, we received every attention and a supply of turtle for both ships, and we proceeded on our voyage at 9 A. M. of the 29th, steering for Rio de Janeiro. May 29.

We found the temperature of the air vary from 74° to 83°, and the surface of the sea from 75° to 77°, at this period of the season. The total absence of all sea-fowl is as remarkable here as in all other parts of the tropics we have visited, except only where small isles have been projected from the depths of the ocean, and afford them resting and breeding places.

On the 3rd of June, when in latitude 15° 3′ S., and longitude 23° 14′ W., being nearly calm and the water quite smooth, we tried for, but did not obtain, soundings with 4,600 fathoms of line, or June 3.

1843. 27,600 feet. This is the greatest depth of the ocean that has yet been satisfactorily ascertained; but we have reason to believe there are many parts of it where it is still deeper. Its determination is another desideratum in terrestrial physics of great interest and importance.

The small island of Trinidad was at this time the nearest land to us; it bore S. 47 W., distant 486 miles. Cape Frio, the nearest part of the continent, bore S. 65 W., distant 1180 miles.

The temperature at twelve hundred fathoms was 39°·5; at nine hundred fathoms, 40°·3; that of the surface, 77°.

June 7. On the 7th we passed within a mile of Trinidad, but there was too much surf for us to attempt to land. On the 18th, at 4^h 40^m P. M., we anchored in the beautiful harbour of Rio. We regretted to find Commodore Purvis had gone to Monte Video, and, moreover, that all our letters had been forwarded to him there, contrary to his express orders. As we could not now get them in less than a month, and not choosing to lose so much time, I determined, as soon as we could complete our magnetic observations, to sail for England.

We found an American squadron lying here, under the command of Commodore Shubrick, upon whom Captain Crozier and I immediately called, and by whom, and his officers, we were most politely received. They had recently returned from Monte Video, the policy of their government not

permitting them to take a part in the prompt and judicious measures adopted by Commodore Purvis and the commander of the French naval force. 1843.

From the British ambassador, Mr. Hamilton, we received every assistance in his power to accelerate our operations; which being completed by the 24th, we sailed at 8^h 15^m A. M. the following day, with a light breeze from the northwest. June 25

Commodore Shubrick sent all the boats of the American squadron to assist in towing us out of the harbour; but the breeze increasing steadily, rendered it unnecessary to avail ourselves of his kind attention.

Favoured by southerly winds, unusual at this season of the year, we made rapid progress over that portion of the passage which is often the most tedious, owing to the east and north-east winds which generally prevail; and, to-day, in latitude July 1.
18° 23′ S. and longitude 31° 53′ W., we got the south-east trade wind.

On the 3rd, at 10 P. M. we crossed the line of no July 3.
dip in latitude 13°·20′ S., and longitude 28°·11′ W., where the trade wind being strong, with sharp squalls and rain, and with much sea running, prevented us making so many observations as we could have wished, and, therefore, the spot upon which we crossed it is not determined with equal precision as on our outward passage.*

* See Vol. I. p. 21.

1843. The current, which at the equator averages a rate of more than twenty miles daily, carried us so far to the westward as to make us cross the line, at 8 P. M. of the 10th, in longitude 25 °54′ W.; and, in accordance with our observations on our outward voyage, the rate of the current in latitude 2° N. exceeded fifty miles per diem.

July 15. On the 15th we entered the variables and experienced the usual unpleasant weather; between $5^h\,30^m$ and 6 A. M. an inch and a half of rain fell, and an inch and a quarter in the two following hours; its temperature was 72°, that of the air, 76°; and again, between noon and 2 P. M. on the 16th, $2\frac{1}{2}$ inches of rain fell.

July 22. On the 22nd, when in latitude 12° 36 N., and longitude 25° 35′ W., we had no soundings with 1850 fathoms, the temperature at that depth 39°·6; at 1350 fathoms, 39°·5; at 300 fathoms, 47°·6; at 150 fathoms, 52°; and at the surface, 79°·5. We were at this time only 140 miles from the Cape de Verd Islands.

Our barometrical experiments appear to prove that the atmospheric pressure is considerably less at the equator than near the tropics; and to the south of the tropic of Capricorn, where it is greatest, a gradual diminution occurs as the latitude is increased, as will be seen from the following table, derived from hourly observations of the height of the column of mercury, between the 20th of November, 1839, and the 31st of July, 1843.

The mean pressure and the amount of atmospheric tide in each latitude are as follows: — 1843.

Lat.	Pressure.	Tide.	
At the Equator.	29·974	·047	At sea.
13° 0′ S.	30·016	·060	„
22 17	30·085	·053	„
34 48	30·023	·052	Cape of Good Hope and Sidney.
42 53	29·950	·050	Van Diemen's Land.
45 0	29·664	·031	At sea.
49 8	29·469	·040	Kerguelen and Auckland Islands.
51 33	29·497	·032	Falkland Island.
54 26	29·347	·022	At sea.
55 52	29·360	·027	Cape Horn.
60 0	29·114	·024	At sea.
66 0	29·078	·016	„
74 0	28·928	·016	„

The above results are arranged in belts of latitude, the observations at sea being separated from those made in harbour; this occasions more apparent irregularity than would have been the case had they been formed into two distinct tables.

It has hitherto been considered that the mean pressure of the atmosphere at the level of the sea was nearly the same in all parts of the world, as no material difference occurs between the equator and the highest *northern* latitudes. At Melville Island in latitude 74¾° it was found to be 29°·870, at Igloolik in latitude 69°, 29·770; and at Winter Island in latitude 66° 11′, 29·798. The cause of the atmospheric pressure being so very much less in the southern than in the northern hemisphere

1843. remains to be determined; and I trust that the very extensive series of observations made on board the Erebus and Terror will be of material assistance in the important inquiry.

Aug. 19. Early on the morning of the 19th, we saw the small island of Corvo, and at noon, when we were within a mile of the shore, two boats came off, loaded with eggs and fish, and fowls, all of which were very acceptable, and were procured without loss of time.

The shores of Old England came into view at
Sept. 2. 5^h 20^m A. M. on the 2nd of September, and we anchored off Folkstone at midnight of the 4th.

I landed early the next morning, and immediately proceeded to the Admiralty, where I met the most gratifying reception from Lord Haddington, Sir William Gage, and my highly valued friends, Admiral Beaufort and Sir John Barrow.

A few days after my arrival in London, I had not only the gratification of receiving the Founder's Medal awarded to me by the Council of the Royal Geographical Society of London, but that which afforded me, if possible, still greater pleasure, was the receipt of the Gold Medal of the Royal Geographical Society of Paris.

The ships proceeded to Woolwich, where they were dismantled and paid off on the 23rd of September; having been in commission rather more than four years and five months; and although they had gone through so much hard work, were as sound

and ready for further service as on the day we sailed from England. 1843.

I cannot conclude the narrative of the voyage of the Erebus and Terror without expressing the high sense I entertain of the cordial and zealous support I invariably received from my excellent colleague, Captain Crozier, and the officers and crews of both ships, by whose unanimity, exertions, and skill, uninterrupted observations were made during the course of the expedition, which will elucidate several points of importance and interest in science, while they present others for examination, and afford a basis of comparison, should that sound mode of prosecuting inquiry be adopted. The geographical researches, moreover, will, I trust, be deemed to have contributed their share to the extension of our knowledge of the more remote southern regions of the earth.

Mount Haddington. Cape Gage.

APPENDIX.

APPENDIX, No. I.

GEOLOGY OF TASMANIA. BY ROBERT M'CORMICK, ESQ. SURGEON OF H. M. S. EREBUS.

THE following general description of the geological and physical features of this beautiful portion of Australasia is chiefly derived from observations made in the vicinity of Hobart Town; and during a rapid excursion I made across the island, from the banks of the Derwent to the embouchure of the Tamar in Bass's Strait, including a short visit to Port Arthur and Tasman's Peninsula.

The general aspect of the country is mountainous, the main chain intersects the island from N. E. to S. W. in a somewhat zigzag course, attaining an altitude of about five thousand five hundred feet above the level of the sea, forming ranges or isolated peaks, intersected by the most fertile plains and valleys, which are watered by numerous streams and rivers, and richly clothed with woods and forests.

Five or six large lakes occupy the higher regions, at an elevation of between three and four thousand feet. The prevailing rocks are basalt and greenstone, occasionally passing into amygdaloid and other modifications of the trappean series; and are variously associated with those of the sedimentary class, calcareous, arenaceous, and argillaceous; these are in many places much inclined, disturbed, and dislocated (as evinced by the numerous faults in the coal formation at Port Arthur), by the intrusion of the igneous rocks at different periods of time. A kind of greywacké is widely distributed.

Basalt and greenstone enter very largely into the composition of the mountain range, cresting it in many places,

the former rising in magnificent columns at Cape Pillar, Cape Raoul, and Fluted Cape, and capping Mount Wellington. Granite occurs in Ben Lomond; and near Lake St. Clair forms the basis of the Western range, crested by quartz. Serpentine is found in the asbestos hills. Argillaceous slate associated with micaceous and siliceous schist, appears near George Town, on the banks of the Tamar. Limestone and sandstone are very generally diffused over the island. Coal is abundant, occupying two coal-fields; that of the valley of the South Esk, and the Jerusalem formation, including Richmond and Tasman's Peninsula. It has been found south of Ben Lomond; and traces of it have been met with across the island.

The total thickness of the coal deposits amounts to about one hundred and fifty feet; and that of the whole of the stratified rocks together, to upwards of two thousand, more than half of this being occupied by the sandstone alone. The coal bed at Jerusalem is more than eight hundred feet above the level of the sea, having the sandstone superincumbent.

At Richmond, abundance of rich iron-ore occurs. Copper, lead, zinc, and manganese are also found. The principal fossiliferous deposits are at Mount Wellington, Richmond, Jerusalem, and Tasman's Peninsula. Silicified trunks of trees, often beautifully opaline, appear imbedded in a vertical position in vesicular lava, on Macquarie plains. Raised beaches, containing shells, occur at various altitudes; from which we may infer that there has been a progressive upheaval of the land.

In the Australian limestone caverns, remains of extinct mammalia have been found: the Dasyurus, Hypsiprymnus, Phascolomyx, Thylacinus, and Macropus, apparently types of existing marsupial animals; whilst others, as those extraordinary forms, Diprotodon, and Nototherium, are wholly unknown.

In my geological rambles in the vicinity of Hobart

Town, I visited a quarry of yellow travertin-limestone, a tertiary deposit coloured by oxide of iron and much decomposed, dipping W.S.W. at an angle of 50 degrees, and abounding in impressions of leaves of Dicotyledonous plants of an extinct flora. Two kinds occur beautifully preserved; but I could discover no traces of shells, although two extinct species, a helix and bulimus, are sparingly imbedded in a similar deposit which appears on the opposite side of the Derwent, at the head of Lindisfern Creek, about two miles from Hobart Town. The limestone is of the same yellowish colour, but more indurated in texture, and has been quarried to the depth of seventy or eighty feet. The shells are found in the upper layer, and both leaves and stems in the lower portion.

The locality of Mount Wellington, which rises to the height of four thousand one hundred and ninety-five feet, on a basis of sandstone, capped, by basalt, two thousand feet in thickness, abounds in organic remains. The sandstone with which the houses in Hobart Town are built, is very soft when first quarried, but hardens on exposure to the atmosphere. In some places it is micaceous, with dark arborescent markings, in others enclosing hard ferruginous-coloured nodules, of various sizes, usually of flattened spheroidal form.

The following species of fossils are found in this locality. Polyparia (corals), Stenopora Tasmaniensis, S. ovata, Fenestella fossula, F. ampla, F. internata, and Hemitrypa sexangula.

Conchifera (bivalve shells), Pecten squamuliferus, P. Fittoni. Brachiopoda,—Spirifera Tasmaniensis, S. subradiatus, Producta subquadratus, and P. brachythærus. Terebratulæ are also met with, and a species of Cypræa (cowrie) has been found in sandy alluvium. The woods on the slopes of Mount Wellington are ornamented with the elegant and magnificent Tree fern.

A large bivalve shell, Pachydomus globosus, occurs in the argillaceous formation at Risdon.

The coal seam at Richmond crops out on the south bank of the coal river; it is about three feet in thickness, and sixty feet above the level of the Derwent. The accompanying sandstone and shales dip south, abounding in impressions of Ferns, as —

Sphenopteris lobifolia, S. alata, Pecopteris Australis, and P. odontopteroides.

About half a mile from the township of Richmond two small knolls of yellowish limestone crop out from the trappean rocks, dipping slightly to the S.W. and much decomposed, assuming a more indurated texture and brownish hue where in contact with the adjacent igneous rocks.

I visited the spot in search of organic remains, but no traces of any could be discovered. Fragments of fossil wood lay scattered about the surface of the neighbouring hills.

In my journey across the country after quitting Hobart Town, I passed Newtown, and crossed the Derwent at Bridgewater. On the left side of the causeway to the ferry is a limestone quarry, dipping 25° to the S.W., and four miles further, a small one of sandstone.

The river Jordan, a narrow stream, intersects the plains of Brighton and Bagdad. At Constitution Hill the sandstone again crops out, dipping S.W. at an angle of 25°. This hill commands one of the finest views in the island. Mount Wellington, with the village of Newtown in its lap, appears in the horizon at the distance of upwards of twenty miles, bounding a rich intervening landscape. The road from this forms a fine curve through the trappean rocks, round a deep wooded glen, resembling the "Simplon," near Richmond, and then continues over the plains of Green Ponds and Cross Marsh to Lovely Banks, a rich fertile tract, studded with lightly wooded knolls, and skirted by sloping banks of green pasture; forming a soft and charming landscape to Spring Hill, which I ascended, and found the summit composed of greenstone. A fossiliferous deposit occurs here, in which the following

species of Conchifera are found; Orthonota compressa, Pterinea macroptera, and Pachydomus globosus.

Stenopora informis, and other species of corals, are also met with, both here and throughout the Jerusalem formation generally, in which, likewise, Spiriferæ and Productæ are abundantly distributed.

The seams of coal alternate with layers of clay and shale, in which Zeugophyllites and the fern Pecopteris Australis are imbedded.

Another species, Pecopteris odontopteroides, occurs in the overlying sandstone, the whole dipping to the south, and appearing again at Richmond and Tasman's Peninsula.

After passing Spring Hill, Jericho appears to the westward, backed by hills, and to the eastward of the road the vale of Jerusalem, a rich verdant-looking flat, dotted over with clumps of wood, and strikingly reminding me of some of the vales in Somersetshire. Over Fourteen-Tree Plain the road is enlivened by vast numbers of parrots, and black and white magpies. Eastward of this, the country presented a somewhat desolate aspect from the number of withered trees, some standing erect, others prostrate on the ground, and the whole interspersed with numerous charred stumps, as if caused by some conflagration in the woods.

From Lemon Springs, Table Mountain, three thousand eight hundred feet in height, is seen to the N.W. at a considerable distance.

Approaching the plain in which the township of Oatlands is situated, the country suddenly changes its appearance; gently undulating slopes of sandstone, covered with rich pastures, on which numerous flocks of sheep were feeding, supersede the wild and rugged, though picturesque, hills and ridges of the trappean rocks. To the eastward of the town is a level tract of mud, several miles in circumference, like a drained lake, having in its centre a hummock

or small island crowned with a few trees; the margin next the town is flanked by sandstone.

The country between Oatlands and Tunbridge is slightly undulating, with park-like plains, glowing with the warm golden yellow tint of the black wattle (a mimosa, and the emblem of the island), and the equally bright and deep orange blossom of the gorse or furze, which perfumes the whole atmosphere with its sweetness and fragrance.

Quamby's Bluff, three thousand five hundred feet in height, is seen from Tunbridge, bearing N.W., and to the eastward lay the Salt-pan Plains, from which large quantities of salt are collected.

Blackman's River crosses the road to Ross.

An alluvial plain of reddish gravel and other transported materials, containing agglomerated pebbles, agates, and cornelians, extends between Ross and Campbell Town. Greenstone is the prevailing rock, in which very curious nodules, from the size of a pea to that of a hazel nut, are imbedded. These agate-like minerals, from their concentric laminated structure, present in their markings externally the appearance of an eye, more especially when polished, and they are frequently found aggregated in clusters in their rocky matrix. Ben Lomond, rising to the height of five thousand feet, is seen from this. I saw here two eagle hawks (Aquila fucosa) soaring overhead, the first I met with, as the bird is becoming scarce in the colony; and that beautiful and elegant species, the white hawk (Aster albus), is, I much fear, destined ere long to become extinct in the island. I saw only one, on Tasman's Peninsula, during my stay in the country. Elizabeth River passes by Campbell Town, from which Quamby's Bluff has a very conspicuous appearance.

A well cultivated agricultural country lies between Campbell Town and Epping Forest, in which some large estates are situated, with well trimmed fields and enclosures and rich soil, equal in appearance to any I have seen

in England. The road winds through the forest for many miles, flanked on either side by the lofty sombre-looking Eucalyptus and the Acacia, the predominant forms of Australian vegetation, forming narrow vistas, across which flocks of miners (Myzantha garrula), parrakeets, and magpies were frequently flitting. On emerging from the forest, a fine sylvan country extends to Perth; greenstone rocks prevailing, and of which the bridge over the South Esk is built. Launceston, one hundred and twenty-four miles from Hobart Town, with Cocked-hat Hill in front, appears skirting the side of a valley, over which a volume of white mist was suspended, half enveloping the town; a frequent occurrence here, from the peculiar locality of the place, situated at the confluence of the two Esk rivers, amidst marshy land. From Launceston I proceeded in a boat down the Tamar to George Town, a distance of forty-two miles. This river, formed by the junction of the North and South Esks, makes a narrow curve in its first reach from Launceston, afterwards expanding and contracting its stream from two miles to a quarter of a mile in breadth. At Whirlpool Reach it is very much narrower, with a strong eddy setting round a ledge of rocks in the centre of the stream. The water is fresh as far as Fresh-water Point, eight miles below Launceston.

Several small bays and islets occur in its course. The Tamar is altogether a far inferior river to the Derwent. The range of hills on either side, scarcely exceeding an altitude of four or five hundred feet, and clothed with sombre woods to their summits, presenting a most monotonous outline. Mount Royal Signal Station, on the eastern bank, about midway between Launceston and George Town, has a striking resemblance to Mount Direction, near Risdon on the Derwent. On the west bank is an argillaceous schist formation, in nearly a vertical position. It has been quarried, and produces abundance of excellent roofing slate. There is also a limestone deposit here.

The Tamar is three miles wide at its mouth, and on

Low Head, its eastern point, is a lighthouse rising to one hundred and forty feet above the sea. Thickets of tea-shrub fringe its banks, and here and there the temporary log-hut of some recent settler, who has cleared away just sufficient elbow-room in the woods for himself and family, breaks upon the solitudeof the scene.

The only birds I saw in my course down the river were four black swans (Cygnus atratus), a cormorant, and a few gulls.

On my return I made a detour from Tunbridge to the lakes; ascending the western tier to an altitude of above three thousand feet, passing for the most part over greenstone rocks, with an occasional outcrop of sandstone. Lake Sorell is between five and six miles in length, and at its broadest part, about the same in width; its shores encircled with wood, and indented by small sandy beaches. The southern extremity is of irregular form from the number of wooded promontories jutting out, and on its S.W. side is a small islet.

Ten black swans with a few ducks and divers were all that I saw on its broad surface.

Lake Crescent lies to the southward of it, and is about four miles in length and two in breadth; with a level isthmus about half a mile broad, of swampy ground, covered by long grass, intervening between it and Lake Sorell, through which meanders a narrow rivulet uniting both lakes.

From the lakes to Bothwell, the country is wild, rugged, and hilly, interspersed with swamp and marsh, and covered by the primitive forests through which winds the River Clyde. The town of Bothwell is situated in a circular valley, bounded by distant hills of moderate height. The approach to it is over a green plain, about four miles in extent. Ten miles further on I examined a bed of micaceous shale, which crops out in a remarkably deep gorge in the trappean rocks, and dips south at an angle of fifteen degrees.

The country improves in appearance approaching Hamilton, becoming more open, now and then swelling into picturesque wooded hills.

The township occupies the bottom of a green valley, and the beautiful grounds of Lawrenny appear through a finely wooded vista beyond it.

On Macquarie Plains I visited the remarkable silicified fossil-tree, imbedded in a vertical position in vesicular lava. Its height above the ground is six feet; circumference, seven feet three inches; and diameter, at the top, fifteen inches. The wood is silvery white, and covered with the finest silicified filaments of a white satin-like hue, resembling in tenuity the finest blown glass. The bark remaining near the base has a yellowish brown resin-like appearance, and when broken, rivals in lustre and beauty the finest agates. The locality of the tree forms the extremity of a ridge of rock of the same kind in which it is imbedded seventy feet above the river, which is here twelve feet in breadth, winding through a wooded ravine one hundred yards across.

A little further down the ridge, is another specimen also vertically imbedded in a chimney-like cavity on the steep face of the igneous rock, the lower portion having disappeared, the cast left by it in the rock is a foot in diameter, and seven feet in length. In the soil beneath, I found a fragment of it having an opaline lustre. About two miles from Rose Garland, near a reach of the Derwent, I saw excavations in a low ridge of scoria, from which two other silicified trees had been removed some years ago. These had also been vertically imbedded, and I found small silicified fragments of them scattered about the spot. All these trees appear to have been coniferous. Five miles from Rose Garland, and twenty feet above the bank of the river Derwent, a bed of sandstone crops out from the adjacent basalt, dipping forty degrees to the S.W., and enclosing cylindrical masses of greenstone from eighteen to twenty inches in diameter, and six feet in length; pre-

senting the appearance of so many imbedded cannon, pointing down on the road at a considerable angle. Along many of the cliffs on the banks of the Derwent, I observed dark shades and lines of dust, indicating traces of coal. West of the town of New Norfolk is a limestone quarry.

TESSELLATED PAVEMENT OF EAGLE HAWK NECK.

In my excursion to Tasman's Peninsula, this singular fossiliferous formation, so called by the colonists, particularly attracted my attention. It is a kind of argillaceous deposit, situated a little to the northward of the neck, or low sandy isthmus, connecting Forrester's with Tasman's Peninsula; having an inlet of Norfolk Bay on the west, and Pirate's Bay on the east. The latter is bounded by argillaceous cliffs, somewhat steep, and of moderate height; at the base of which the wash of the sea has formed a sort of platform, on which it breaks at high water. The siliceous clay forming this platform is very remarkably divided by the most symmetrical partings into slabs, varying in length and breadth, having their margins frequently bordered in strong relief. The dimensions of those I measured were from three to nine feet long, and from four or eight inches, to six feet broad, and others were eighteen inches square. These divisional planes had a general bearing of E. by N. with a perfectly geometrical parallelism in relation to each other.

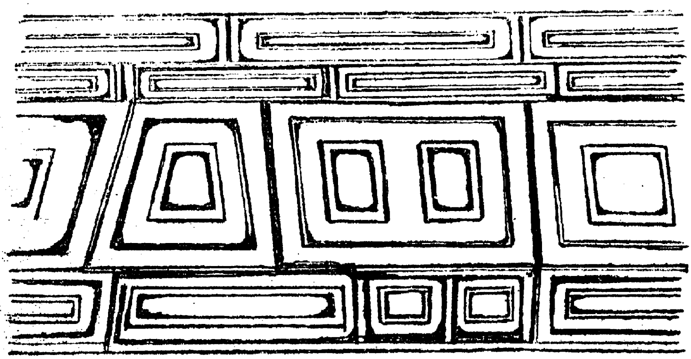
The curious structure displayed here may, probably, be due to some re-arrangement of the particles coming under the influence of electro-magnetic forces whilst passing into a solid state, giving a definite direction to the ordinary partings which argillaceous depositions frequently present when contracting under sudden changes of temperature during the process of consolidation.

Spirifera vespertilio and Spirifera avicula are profusely imbedded in this deposit.

The argillaceous cliffs at Point Puer, Port Arthur, contain the same species of shells, with Pachydomus globosus.

The two coal mines at present worked in Tasman's Peninsula, are situated on the west side of Norfolk Bay. In the older mine I descended a shaft twenty-six fathoms deep, sunk in the vicinity of some columnar trap. The coal-seam, from four to six feet in thickness, appears beneath a bed of overlying sandstone, having a greenish tinge. Low and narrow tunnels have been worked to a distance of three hundred feet from the shaft; with the usual swampy muddy floor I have observed, in the coal mines on a larger scale, in the North of England. Sixty men are employed in this mine, and the average quantity of coal daily raised from the pit, amounts to forty chaldrons. In the mine last opened, situated near the beach, the coal which is of better quality is so near the surface that a straight tunnel has been excavated through it horizontally, to the distance of forty-seven yards. It has not yet been worked to its entire depth. The same kinds of fossil plants and wood occur in the two mines, with the sandstone super-incumbent, as at Richmond, &c.

The accompanying rough pen and ink diagram, may convey a better impression of the appearance of the fossiliferous argillaceous formation at Eagle Hawk Neck, than any written description.



APPENDIX, No. II.

[Referred to in Vol. II. p 13.]

MEMORAMDUM OF PARTICULARS CONNECTED WITH THE JUVENILE ESTABLISHMENT AT POINT PUER.

Point Puer, 24th October 1840.

Number of boys transported from

London	207
Liverpool	22
Manchester	31
Birmingham	20
Bristol	18
Various towns in England	152
Dublin	1
Various towns in Ireland	15
Edinburgh	23
Various towns in Scotland	64
Wales and Van Diemen's Land	2
Total	555

Sentenced Seven years	444
Ten	71
Fourteen	23
Fifteen	5
Life	12
Total	555

Could read on landing	415
Could not read on landing	140
Total	555

Could write on landing - - -	154
Could not write on landing - - -	401
Total - - - -	555
Could cypher on landing - - -	93
Could not cypher on landing - - -	462
Total - - - -	555
Attended National school - - -	157
British - - - -	27
Sunday - - - -	69
Private - - - -	158
No - - - - -	144
Total - - - -	555
Had both Parents living - - -	239
Father only - - - -	109
Mother only - - - -	131
No Parents - - - -	76
Total - - - -	555
Maximum age of boys on arrival - -	18
Minimum age of boys on arrival - -	10

APPENDIX, No. III.

GEOLOGY OF NEW ZEALAND. BY ROBERT M'CORMICK, ESQ., SURGEON OF H. M. S. EREBUS.

My observations on the geological structure of this new colony were limited chiefly to the northern portion of the North Island, the Bay of Islands, and its vicinity.

The bay, perhaps, the finest harbour in New Zealand, is studded with several islands, and has its shores bounded by argillaceous cliffs of moderate height. The clay of which these are composed is of a yellow colour, variegated by a reddish tint, and rests upon a substratum of trappean rocks, fragments of which, more especially greenstone, frequently occur imbedded in it. A low tract of prismatic basalt, intermingled with scoriæ and greenstone, extends between the Waitangui and Kiddi-Kiddi (or, as it is also called, Keri-Keri) rivers. This, doubtless, has been a lava current, the source from whence it flowed being pretty clearly indicated by a conical crateriform hill, situated at no great distance inland of it. Several rivers fall into the bay, whose shore is intersected by numerous ravines, creeks, and mangrove swamps, Manawa (Avicennia tomentosa). Whilst the Expedition remained in the bay, the Manuka, or tea shrub of the New Zealanders (Leptospermum scoparium) was in full flower, and lent a cheerful appearance to the sides of the hills, over which it was spread in profusion; the paths of the natives leading in an intricate maze of windings through it around every neighbouring hill. That beautiful tree the Pohutukava (Metrosideros tomentosa) was just beginning to put forth its rich crimson blossoms, amid a deep green clustering foliage; and it appeared to be the favourite station of the

Kotaritari, a small kingfisher (Alcedo cyanea), whilst watching for its prey in the waters beneath.

In an excursion to Waimate, a missionary station, about fifteen miles inland of the bay, my course lay over hills about seven or eight hundred feet in height, crested with trees, or clothed with fern (Pteris esculenta),— once constituting the main subsistence of the natives,— and intersected by deep and densely wooded ravines. On crossing the second range of hills, I came upon the fern-clad plateau of the Waimate, and made a detour to the left, to examine some limestone rocks, cropping out from the bed of the Waitangui River, which is here about thirty feet wide; and the current setting so rapidly round the sharp curve it makes between its steep and wooded banks, that the horse I rode lost his footing, and had some difficulty in stemming it, whilst I chipped off specimens from two highly crystalline blocks of white marble, rising four or five feet above the centre of the stream, which ran S.W. and N.E.; the strike of the bed of limestone being E.N.E. and W.S.W., but no discernible dip.

On the approach to Waimate, emerging from a narrow belt of wood, ornamented by a large graceful tree-fern, the settlement, with its neat new church, farms, and houses enclosed in flower-gardens, — having a thoroughly English aspect,—all at once burst upon the view, amidst the surrounding fern-clad region, like an oasis in the desert. The decomposing greenstone in the vicinity presents a globular jointed structure, spherical masses of which, resembling cannon-balls, lay scattered about the surface of the soil, near a forest of the Kaudi pine (Dammara Australis), the only cone-bearing pine in the island, and confined to its northern part, where the stiff clayey soil seems favourable to its growth; it is mostly found in hilly situations, in the vicinity of the sea, usually with a quantity of its yellow transparent resin (pare) imbedded at its base. The thirty-eighth degree of south latitude is about the limit of its geographical range.

Ten miles from Waimate, I ascended a truncated cone-shaped hill, terminating in the most symmetrical and perfect crater I have ever seen, forming a circular bowl, nearly 300 feet in depth, and much about the same in diameter, strewed over with fragments of scoriaceous lava, basalt, and greenstone, and densely lined with trees and tangled underwood, through which, after some little difficulty, I scrambled to the bottom; where the almost death-like solitude of the scene was broken only by the melodious note of that elegant and singular bird, the Tui (Meliphaga concinnata), which, like the American mocking-thrush, imitates the notes of every other bird in the forest.

On one side of the hill is a steep ravine, which once gave exit to the lava current, but is now separated by an embankment of scoriæ, which here completes the rim of the crater. Numerous ancient native "pahs" crest the neighbouring hills.

About a mile to the north of this once volcanic vent, which has long been in a state of repose, are some thermal springs, forming small pools in a level tract of scoriaceous lava, overgrown with rushes, from which sulphuretted hydrogen gas rose in bubbles to the surface; the grass on the margin was incrusted with a deposit of sulphur, yet the water is not unpleasantly impregnated with it.

Some miles distant are a lake and hot springs, which my time did not permit me to visit. On my return to the bay, I passed the Waitangui Falls, forming a pretty little cascade over basaltic rocks into the channel of the river beneath, where it sweeps round a sandy cove, not far from its exit into the bay. From this waterfall the river receives the name of Waitangui, meaning in the Maori, or native language, "crying, or weeping waters."

In a boat excursion I made up the river Kiddi-Kiddi, I found the banks composed of the same kind of argillaceous deposit resting on a trappean basis, as on the shores of

the bay. About six miles up, the stream divides into two branches; I followed the one to the left, on the right bank of which a bed of pipe-clay (kotare), twelve feet in thickness, striking S.E. and N.W., crops out from columnar greenstone.

At the missionary station I landed, and crossed over a platform of fern for about two miles to the Keri-Keri falls, which descend over a perpendicular escarpment of basalt eighty or ninety feet high into the ravine below: this is scattered over with fragments of rock, and its banks finely wooded, between which the river continues its winding course. Behind the cascade, and beneath the basalt, is a cave nearly a hundred feet wide, about forty deep, and much the same in height, from which the spray of the falling waters (termed by the natives waianiwaniva, or rainbow-waters), produces a pretty effect, forming a complete curtain of mist in front of the cavern, the roof and floor of which are crusted over with ochraceous clays of various colours. The red ochre (kokowai), and the blue (pukepoto), are used by the natives to paint their skins. On rounding the point at the entrance of the river, on my return to the bay, in the dusk of the evening, the splash of the boat's oars breaking on the silence of nightfall, disturbed a whole colony of cormorants (Phalacrocorax), the kauwau, or preachers of the natives, who had built their nests on the tops of a group of trees, over which they hovered in the wildest confusion and uproar.

In a boat excursion on another occasion, up the river Kawa-Kawa, or Bitter-Bitter, the main continuation of the bay, I landed on the left bank, and proceeded over about four miles of a fern-clad table land to the valley of Waiomio, where some remarkable groups of marble crop out from the adjacent hills of greenstone, to the height of from ten to about forty feet, in castellated forms, like ancient ruins, grown over with trees and shrubs, and occupying a somewhat irregular circle, having the same general bearing, E.N.E. and W.S.W., as the Waitangui marble.

Most of the masses were white, hard, and crystalline, having sharp and angular edges, with a blackened surface, and horizontal stratification. One group was of a reddish yellow colour, and of coarser grain than the rest. As I was about ascending the highest group, my steps were arrested by a chief much tattooed, who suddenly emerged from the wood, and gave me to understand that the place was "tapu," or forbidden ground, being the "warau," or burial-place of his tribe, who inhabited the village of Waiomio, on the banks of the river which meanders through the valley beneath, in a S.E. and N.W. course.

As the boat passed the missionary station on the Kawa-Kawa, I observed something suspended in the air like a hawk hovering over its quarry; but which turned out to be a kite, the flying of which is here an amusement of the Maori children. It is most ingeniously made from the leaves of a species of Cyperaceæ, or sedge, with wings resembling a bird, from which it receives the names "manu," a bird, or "paku," wing of a bird; the Phormium tenax furnishes its flaxen string.

From the foregoing remarks on the northern part of the island, it will be perceived that New Zealand has a volcanic substratum of basalt and greenstone, with a superincumbent deposition of clay, through which beds of limestone and sandstone crop out in various places. The limestone cliffs at Waingaroa Bay contain fossil shells of the following genera: — Ostrea, Pecten, Terebratula, and Turritella, with Asterias and Echinus: the neighbouring sandstone being much interrupted by greenstone dykes. Layers of lignite are found in beds of loam. This carbonised wood, which is said to have belonged to Kaudi and Pohutukava trees, is abundantly distributed, both on the east and west coasts, especially in the valley of the Thames, associated with horizontal sandstone formations near Auckland. Copper ore, in micaceous slate, has also been found in this locality. Fossil shells occur in the vicinity of Poverty Bay. The Green Jade, or a variety of serpentine, of which

the Meri, or native club, is made, is found only in the southern island, and is much valued; it is called Ponamu by the New Zealanders.

Cape Maria Van Diemen, the north-western extremity of the island, is composed of a volcanic conglomerate; in the vicinity of which is the Reinga, or entrance to the New Zealanders' world of departed spirits, which they suppose to be down a steep escarpment of conglomerate rock, overhung by an aged Pohutukava tree, from which the spirit is said to take its final flight to the region below. This sacred spot is the Land's End of the natives, "Te muri wenua." Coal has been found in the sandstone, overlaid by this conglomerate, but to no great extent.

Fossil bones of a large extinct struthious bird, known to the natives by the name of Moa, have been discovered in the alluvium of the mountain streams of Hikorangi on the east coast. It has received the name of Dinornis gigantea, and its height has been estimated at sixteen feet: remains of several smaller species have been also found.

Its only existing type is the Kiwi Kiwi, or Apterix Australis, a bird now becoming very scarce, and, like its gigantic predecessors, destined to become extinct. The natives formerly hunted it for its feathers, of which they made beautiful mats: but since the introduction of the dog and cat, its destruction has been rapidly accelerated; and, as it lays only one egg, its total extirpation cannot be far distant. It is a nocturnal bird, burrowing in the ground during the day, and wandering about the deepest recesses of the forest in the night, in search of the larvæ of insects, and seeds of a rush (Astelia Banksii), its favourite food. It is now mostly met with in the locality of the East Cape.

The principal mountains in the interior are Ruapahu, rising to the height of 9000 feet above the level of the sea, Taranaki, or Mount Egmont, to about 8800, and Tongariri,

to somewhat more than 6000 feet. The latter is the great centre of volcanic action, and has a large crater on its summit, sending forth smoke and steam, and from which eruptions of lava not unfrequently take place. Pumice, obsidian, and porphyry are abundantly distributed about this district. Hot springs (pui) are numerous; some have an argillaceous, others a sulphureous taste, and often a boiling temperature, accompanied by continuous subterranean sounds. Cold saline springs occur near the hot ones. Shocks of earthquakes, termed by the natives "Wiringa O te Wenua," or, trembling of the land, are occasionally felt. Ruapahu is even in summer covered with perpetual snow, the snow-line being here at an elevation of about 7000 feet. A chain of lakes extends through the interior. Taupo, the largest, is thirty-six miles long, and twenty-five broad, of a triangular shape, encircled by high cliffs, and situated in 39° south latitude, and 176° east longitude, at an elevation of 1300 feet above the sea, and Lake Rotu Aire at 1700 feet. On White Island (Puhia-i-Wakati) there is also a volcanic vent, sending forth smoke and vapour. Raised beaches occur on the coast, indicating here, as in Tasmania, an upheaval of the land.

The climate of New Zealand is so fine and equable, that the mean annual temperature falls little short of 60° Fahr. It is humid, as might be expected, in two narrow islands, 800 miles in extent, covered with forests, and on all sides encompassed by a vast ocean. Northerly winds prevail in winter, and the southerly in summer.

In the month of November, "Marama-ko te-ono," or sixth month of the New Zealanders, I found the nights so mild, that having on one occasion extended an excursion inland from the bay, to a greater distance than I had anticipated, in search of that beautiful species of pigeon, the Kukupa (Columba Novæ Seelandiæ), which conceals itself in the deepest recesses of the ravines, feeding on the berries of the liands (Smilax), and other seeds, and where it is most

difficult to find, night closed in upon me, before I could retrace my steps through the many dense thickets of wood, and hills of high fern, which lay between me and the anchorage of the ships; and I slept in the open air, without sustaining any other inconvenience than that of being awoke somewhat early in the morning by a shower of rain, with no other covering than some withered clematis, the fern being wet with the dew. The beautiful white flowers of the clematis appeared suspended in graceful festoons from the tops of the highest trees.

I, however, had no reason to regret passing the night in the woods, as I not only succeeded in shooting some pigeons, but it afforded me a fine opportunity in my favourite pursuit, ornithology, for observing the habits, and making myself acquainted with the notes of the various species of the feathered tribe. The bottom of the ravine, on the margin of which I passed the night, was brilliantly illumined by phosphorescent particles, which glittered like so many glow-worms, or fire flies, in the decaying wood. Over head, the Peka-peka, a small bat (Vespertilio tuberculata),—the only mammal in the country, with the exception of the native rat (kiore maori), which is now become nearly extinct—silently wheeled in circles above the wood, and in the topmost branches of a tree, the Ruru-ruru, a small owl (Strix Novæ Seelandiæ), kept up its incessant monotonous cry of "More-porke, more-porke," throughout the night. At dawn, I heard the voices of the natives, mingled with the barking of the dogs, and crowing of the cocks in a village, from which I found that I had been separated only by a Raupo swamp below me, overgrown with the typha, or bullrush, the favourite haunt of the Matuka, or Bittern (Ardea Australis), the Pukeko (Porphyrio Australis), and the Parera, or wild duck (Anas superciliosa). The latest bird in the evening was the Piwaka-Waka, an elegant little flycatcher (Rhipidura flabellifera), and the earliest in the morning was the Tui.

APPENDIX, No. IV.

GEOLOGICAL REMARKS ON THE ANTARCTIC CONTINENT AND SOUTHERN ISLANDS, BY ROBERT M'CORMICK, ESQ., SURGEON OF H.M.S. EREBUS.

THE earth's crust, as we approach towards the pole in the southern hemisphere, presents, in a remarkable degree, the most striking indications of the vast subterranean fires pent up within it, and, as we now find, having vents in both the frigid zones: the volcano of Jan Mayen, actively burning within the Arctic circle; and Mount Erebus, rising from the lofty mountain range of the newly-discovered continent of Victoria, to an altitude of more than 12,000 feet above the Antarctic Ocean, and sending forth its smoke and flame to the height of 2000 feet above its crater, the centre of volcanic action in those regions of eternal snow.

On our first voyage south, after sailing from the River Derwent, Tasmania, on the 12th of November, 1840, we proceeded to the Auckland Group, and Campbell Island, the former situated in about the latitude of 51° S., and longitude 166° E., and the latter in the 53rd degree of latitude. Both are of igneous formation, being chiefly constituted of basalt and greenstone, forming hill ranges, nowhere exceeding an altitude of 2000 feet. The basalt frequently occurs in the prismatic form. At Deas Head, a promontory 300 feet in height, in Auckland Island, these prismatic pillars were highly magnetic.

Pebbles of quartz and agate occur amongst the shingle on the beach at Campbell Island, and some traces of limestone; the only indication of the sedimentary class of rocks which we met with after our departure from the Australian Lands.

Auckland Island is thickly wooded, with trees belonging principally to the Myrtaceæ, Veronica, Araliaceæ, and Epacrideæ, forming dense thickets, from twenty to thirty feet in height, almost impenetrable, and impervious to the sun's rays. The alluvium beneath is clothed with ferns and cryptogamic plants, growing in rank luxuriance, the decaying trunks of fallen trees being completely shrouded within lichens and mosses. The soil is generally good, composed of a rich black mould, in many places of considerable depth — the result of decomposition of the volcanic debris and a redundant vegetation — so highly productive, that it would render the islands well worth the attention of colonists.

In some of the valleys, the bright golden yellow blossoms of a species of Asphodeleæ* are so thickly grouped together as to form the most beautiful lively-looking patches, spread out like a carpet of gold, as if to relieve the sombre shade of the woods.

The climate, although somewhat humid and subject to heavy squalls, is nevertheless very healthy; and the harbours are excellent.

The common hog, introduced originally by some whaling ship, runs wild in the woods; and from the extent of soil rooted up by these animals in search of the roots of an umbelliferous plant, on which they feed, and which gives to their flesh a peculiar flavour, they must be tolerably numerous, although I saw only two during my rambles, the thick cover affording them ample means of shelter.

The birds are few in number, both in species and individuals, and are all belonging to New Zealand species; the Tui (Meliphaga concinnata) and Korimaku (Certhiæ olivaceæ) being the chief choristers of the woods: these, with two or three other small species of the Meliphagidæ, and a hawk, a small parrakeet, and the Pihoihoi, or Ground

* Chrysobactron Rossii. Flora Antarctica, vol. I. p. 72., plates with notes.

Lark (Anthus Novæ Seelandiæ), were all the land birds met with.

The water birds consisted of a duck (Anas superciliosa), a Merganser (Mergus Australis), a penguin (Aptenodytes antipodes), a snipe found in the high grass near the bay, and two species of gulls (Larus littoreus, and L. Novæ Hollandiæ,) frequented all the bays in considerable numbers.

In Campbell Island, situated not much further south, and although less wooded than Auckland, having many of its valleys overgrown with underwood, and the general character of the vegetation similar, I did not meet with a single land bird.

These islands appear to be the favourite breeding-places of the Albatross (Diomedea exulans), and during our stay in the months of November and December they were so busily employed in the work of incubation, as to allow themselves to be caught, without making an effort to escape. It is an amusing scene to watch a group of these birds, a dozen or more, assembled together on the side of a hill, grotesquely waddling about, selecting their mates; this being settled, they disperse, and each pair fix upon a spot for the nest. This consists of a mound of soil, intermingled with withered leaves and grass, the average dimensions of which I found to be eighteen inches in height, twenty-seven inches in diameter at the top, and six feet at the base. The albatross, like the petrels, only lays one egg, of a white colour, averaging seventeen ounces in weight. In one instance, only, I found two eggs in the same nest (both of the full size, and one of them unusually elongated in its longest diameter), although I must have examined at least a hundred nests. The snow-white head and neck of the albatross appearing above the grass when sitting on its nest, betrays its situation at a considerable distance. When forced off its egg, it makes a resolute defence, snapping the mandibles of its beak sharply together in defiance. I have frequently found it sleeping in the day-time, with its head under its

wing. Its greatest enemy is the Lestris antarcticus, a fierce raptorial gull, which is constantly on the watch for the bird quitting its nest, when it will instantly pounce down upon and devour the egg. So well is the albatross aware of the propensity of its enemy, that it will snap its beak loudly whenever it observes this rover hovering overhead. Three or four species of petrel were breeding in the holes of the cliffs overhanging the bay.

The oceanic birds met with, after our departure from Campbell Island, were albatrosses, petrels, and penguins. Those most frequently seen were Diomedea exulans, D. fuliginosa, Procellaria gigantea, P. capensis, P. pelagica, P. Cookii, P. vittata, and P. marina. Two species of seaweed were frequently passed floating on the surface of the sea, a Laminaria, and the Macrocystis pyrifera; the latter was met with as far south as the sixty-fourth degree.

On crossing the Antarctic circle on the new year's day, the White Petrel (Procellaria nivea), the sure harbinger of ice, first made its appearance; it is the most elegant and beautiful species of all the petrels, and delights to be in the vicinity of ice; for during the summer season it is scarcely ever seen north of the Antarctic circle. It will often, after gracefully skimming the surface of the ocean in search of shrimps and small fishes, elevate its flight, and amuse itself in making rapid circles round the ship. Whilst going through their various evolutions, I have often succeeded in obtaining specimens by shooting them from the deck to windward, so as to secure their falling on board.

On the 11th of January, 1841, in latitude about 71° S., and longitude 171° E., the Antarctic Continent was first seen, the general outline of which at once indicated its volcanic character; rising steeply from the ocean in a stupendous mountain range, peak above peak, enveloped in perpetual snow, and clustered together in countless groups resembling a vast mass of crystallisation, which, as the sun's rays were reflected on it, exhibited a scene of such un-

equalled magnificence and splendour as would baffle all power of language to portray or give the faintest conception of. One very remarkable peak, in shape like a huge crystal of quartz, rose to the height of 7867 feet; another to 9096; and a third to 8444 feet above the level of the sea. From these peaks ridges descended to the coast, terminating abruptly in bold capes and promontories, whose steep escarpments, affording attachment to neither ice nor snow, alone showed the jet black lava or basalt which reposed beneath the mantle of eternal frost.

On the following day I landed on a small island (Possession Island), lying a little to the eastward of the main land in latitude 71° 56′ S., and longitude 171° 7′ E., which I found to be composed of a volcanic conglomerate, vesicular lava, and basalt, containing imbedded crystals, and rising to the height of about three hundred feet.

As we pulled round the island in the boat, we passed a beautiful little recess in the prismatic columns of basalt, presenting a miniature resemblance to Fingal's Cave in Staffa. The spot on which we effected a landing was ice-girt, between which and the foot of the hill a colony of penguins (a new species) had formed a rookery, and were busily engaged rearing their young. They were in such countless multitudes, that it was with difficulty we could make our way through them; and their clamour baffled all description. The young were covered with down, but no eggs were found. The spot on which they were breeding was spongy and elastic, forming a rich bed of guano of great depth, the accumulation of ages. I shot a Lestris antarcticus, flying overhead, which was of smaller size, and much greyer about the head and neck than the Auckland specimens.

On the 28th, in latitude 77° 31′, and longitude 167° 1′, the burning volcano (Mount Erebus) was discovered, covered with ice and snow from its base to its summit, from which a dense column of black smoke towered high

above the numerous other lofty cones and crateriform peaks with which this extraordinary land is studded, from the seventy-second to the seventy-eighth degree of latitude. Its height above the level of the sea is 12,367 feet; and Mount Terror, an extinct crater adjoining it, which has, doubtless, once given vent to the fires beneath, attains an altitude little inferior, being 10,884 feet in height, and ending in a cape, from which a vast barrier of ice extended in an easterly direction, checking all further progress south. This continuous perpendicular wall of ice, varying in height from 200 to 100 feet, its summit presenting an almost unvarying level outline, we traced for about 300 miles, when the pack-ice obstructed all further progress. Soundings were obtained within a quarter of a mile of it; in 318 fathoms on a bottom of green mud.

This appeared to be the favourite haunt of the White Petrel; an Antarctic Lestris occasionally intruding on its icy domain: whilst, reposing on the ice, were numerous penguins and seals, and, in the open water, whales were spouting in all directions, chiefly the "Finner," and a beautiful piebald grampus, or small whale, spotted reddish brown and white. On our return we sighted Balleny Islands, in lat. 68°, and long. 169°; they present the same volcanic outline as the rest of the land to the southward.

On the second voyage south, we took our departure from the Bay of Islands, New Zealand, in the month of November, 1841, but did not meet with any land; having been beset for many weeks in the pack-ice, and our progress towards the Pole again checked by the Barrier, which we made more to the eastward than last season, in lat. 78° 10′ S., being the highest latitude we attained. On our return we doubled Cape Horn on the 2nd, and arrived at Port Louis, East Falkland Island, on the 6th of April 1842.

Prior to our third and last voyage across the Antarctic circle, we visited—

HERMITE ISLAND.

This island lies about ten miles north-west of Cape Horn, near the latitude of 56° S., and, with the exception of that celebrated cape, is the southernmost of those Fuegian Isles in which the vast continent of the New World terminates to the southward. It is of irregular form, deeply indented by bays and coves; its shores bold and steep, surmounted by conical peaks, that of Mount Kater being 1742 feet above the sea. Its greatest length is from east to west, being twelve miles. The geological structure is very simple, being entirely of plutonic origin: syenitic greenstone, resting on a basis of granite, with here and there some quartzose and felspathic rocks. Having ascended all the peaks bounding St. Martin's Cove, I found them composed of syenitic greenstone, with the exception of Forster's Peak, which is capped with a hard, fine-grained, dark greenstone; and the same kind of rock also occurs scattered about in masses over the western ridge, and in a cleft at the base of Mount Kater. The greenstone has polarity, and is highly magnetic in places.

In an excursion I made across the central ridge of hills to the northern shore of the island, I found the nest of the Antarctic Goose (Anas antarctica), containing seven eggs, about the size and colour of a duck's; the nest, which was formed of down from the breast of the bird, was concealed amongst grass in the bank skirting the beach, near a Fuegian hut; from which two of the natives made their appearance, and expressed by signs their great desire for the eggs; but on my shooting the goose, and leaving it in their possession, they seemed quietly enough disposed to receive it as an equivalent. This circumstance enabled me very satisfactorily to account for the great scarcity of birds in this island, as their eggs are doubtless all devoured by the Fuegians as soon as laid. Near the

wigwam I also shot a very beautiful species of Polyborus, the only one of the kind I obtained on the island.

In an excursion to the southernmost point of the island, Cape Spencer, to the summit of which I ascended, my course lay over a ridge of granite, commencing at St. Joachim's Cove (a small white sandy beach), and extending to the base of Cape Spencer, which is composed of the same rock.

Along the ridge enormous blocks of this rock are scattered about in the wildest confusion; some of these masses were traversed by veins of a dark green, compact greenstone, varying from three inches to three feet in breadth. The summit of Cape Spencer is syenitic greenstone, in broken fragments piled one upon another, and enclosing a crater about two hundred feet in depth; its bottom was occupied by a lake, frozen over on its north side. This crater is about a mile in circumference, its greatest diameter being from north to south. Its highest part is on the west side, forming a very narrow ledge, along which I proceeded to the southernmost precipice overhanging the ocean. This spot commands a fine extensive prospect all round, and the sun shining forth from a clear blue sky rendered every object distinctly visible to a great distance. To the north appeared the snow-capped mountains of Tierra del Fuego, and its many isles. In the S. W. quarter, the Diego Ramirez rocks were faintly delineated above the horizon, like a few small hummocks.

Cape Horn stood boldly forth to the S. E., and the surface of the vast ocean was spread out beneath me to the south. Whilst surveying the scene around me, the solitude of which was broken only by the Polyborus or Fuegian Hawk hovering overhead, my eye suddenly rested upon half a score of the dusky forms of the Fuegians, wending along one of their tracks in the valley beneath in single file, in the direction of their wigwam, at Joachim's Cove; returning in all probability from an excursion in search of limpets along the ledges of

rocks bounding the coast. Elevated as I was above them, and sitting amongst piles of rocks, I did not escape their keen, quick eyes; for I observed them, more than once, come to a halt to reconnoitre my position.

LOUIS PHILIPPE LAND,

Off which the Expedition was so long beset amid pack-ice and a chain of bergs, in the last attempt to penetrate south, is, like other Antarctic lands, apparently of igneous formation. The first portion of it that we made appeared like a vast wreath of snow banked up against the horizon, extending from W. to S. E. by S. The central and highest part might be estimated at about 2000 feet above the level of the sea; sloping gradually down on either side to a low point. The coast-line alone, where bergs had been separated, presented an uneven surface. The highest point was marked by the tops of two black peaks, appearing through the mantle of snow, which enveloped the rest of the land.

A small snow-clad islet lies off its western extremity, about a league distant; and as we coasted along the southern portion, we passed a chain of six low islands, partially covered with snow, the exposed rock having the appearance of lava or basalt.

We next passed a large opening in the land, which had the appearance of a strait, bounded on the right by high, bold, black cliffs, which stood out in strong relief against the snow, with which the low left side was covered, sloping down towards the farthest visible extremity, where the strait appeared to curve round. The entrance is from four to five leagues in breadth, having a conical island in its centre, terminating in a crateriform peak, of black lava-like looking rock, nearly bare of snow. A large colony of penguins had established their rookery at its base, it being the breeding season. Cormorants, black-backed gulls, terns, white petrel, and the lestris

antarcticus, were breeding there; and doubtless, also, that anomaly amongst birds, the Chionis, the eggs of which form such a desideratum in ornithology; and I regret much not having had an opportunity of landing in search of them. To the S. W. of this strait, we discovered more land, commencing with a low black ledge, singularly marked by waved lines, running south, resembling streams of lava, and the only portion of the land without a vestige of snow. From this, bold and rugged cliffs arose, covered with snow, their steep, black escarpments only appearing through it, the shores being girt by an icy barrier. The extremity of the land seen terminated in a bluff, black-looking headland, bearing W. by S. I obtained a mass of hornstone, imbedded in a layer of blue mud, from a piece of ice, alongside which we watered the ship. As I had no opportunity of landing for specimens, I was in the habit of examining the stomachs of most of the birds which I shot and preserved for the Government Collection; and found the penguins my best geological collectors, for their crops were frequently filled with pebbles; more especially the large species, Aptenodytes antarctica. In one of these individuals I found upwards of a pound of small fragments of rocks; comprising, basalt, greenstone, porphyry, granite, vesicular lava, quartz, scoriæ, and pumice; but none of them ever brought me a vestige of aqueous rocks,—all were volcanic,—and such the appearance of the Antarctic lands, even at a distance, would proclaim them to be.* We saw three species of

* As the absence of the sedimentary class of rocks may appear unfavourable to the existence of an Antarctic continent, it must be understood, that my remarks have reference only to the land seen, and that merely the coast-line. Aqueous formations may exist in the interior, beneath the covering of ice and snow; but, it is not the less remarkable, that the land, generally, in the Antarctic regions should present so strikingly the volcanic character. Whilst within the Arctic circle, although the trappean rocks are not excluded, which the active volcano of Jan Mayen itself attests; yet, the sedimentary formations have a vast preponderance over the igneous. Spitzbergen and its islands forming the northernmost known land, which I had myself an oppor-

penguins within the Antarctic circle. The larger kind, "Aptenodytes antarctica," attains a great size. I preserved one, weighing seventy-five pounds. It is a scarce bird, generally met with singly; and I have never seen more than two or three together; whilst the two smaller species congregate in immense numbers. I know not to what cause we can assign this very remarkable paucity of individuals in the larger species.

After reaching the latitude of 71° 30′, in the meridian of 15° west, we returned to the Cape of Good Hope, on the 4th of April, 1843; thus completing the circumnavigation of the globe.

APPENDIX, No. V.

Referred to p. 115., Vol. II.

CHATHAM Island, placed to the east of 180° upon old charts, and to the west of the same meridian upon the directory of Captain Dumont D'Urville, compiled in 1835, is situated in 43° 52′ south latitude, and 179° 14′ west longitude (from Paris), and is, so far as we could judge, about eighty to ninety miles in circumference. It has a good bay, of eleven miles in length, and of about the same depth, open to the south-west winds. At the bottom of this bay, on the right, towards the east, behind a red point, there is a cove, where three or four ships may find shelter by anchoring very close to the shore, in six or seven fathoms water, upon a good holding ground of sand, so as to have the red point to bear W. ¼ S.W. or even west, if the draught of water of the vessel will admit. Further in, towards the south, is a bank of rocks covered with floating seaweed, near which there are three and a

tunity of examining, when belonging to H.M.S. Hecla, in the last attempt to reach the North Pole, present not a vestige of lava or basalt, but are constituted chiefly of the primary and transition rocks.

half fathoms of water; beyond the weed there is another bank of rocks, exposed at low water. A small vessel may anchor within these reefs, where there is a depth of from eleven to thirteen feet, and always smooth water.

This creek is called Wai Tangui, which signifies noise of waters, or sounding waters. It is upon its banks or shores that the tribe of Eitouna was established.

At a mile and a quarter to the north of the red point is a bank, upon which there are only six or seven fathoms water; the sea breaks upon it in strong winds, and it abounds with fish.

At 40 W. (true) from Red Point, at a distance of nine miles and a third, is a fine little cove, called Wangaroa (Anse d'Ubraye). It is open to the south-east, and the sea is always tranquil. The entrance is rather more than half a mile in breadth, and a mile in depth. To the right and left, in entering, are some rocks under water, which extend a small distance from the shore, and upon which the sea almost always breaks. There is no occasion to avoid a large bank of floating sea-weed which lies in the middle of the passage, a little within the cove; there are eleven fathoms water upon it. But it is necessary to avoid getting amongst the sea-weed further in upon the south-west side, because there are amongst it some points of rocks on which there are only twelve or thirteen feet of water. The north-east side is also lined with sea-weed. The anchorage is between two small indentations, opposite to each other, and one third of a mile from the end of the cove, in eight fathoms water, which forms a kind of basin. The principal Pah of Eimaré is built upon the north-east side of this cove.

At Wangaroa, as at Wai Tangui, wood and water may be had at the end of the cove. W. 30° S. of the Wangaroa cove, at a distance of four miles, is that of Jean Bart, a little larger than the former; its direction is S. S. E. and N. N. W. It is less protected from winds between S. W. ¼ S. and S. E. ¼ S.

Between Jean Bart cove and the point of this name, which is three miles and a half W. 30° S., is a rock. It is placed half way between the cove and the point, and lies off the coast about half a mile.

W. 35° S. from Jean Bart Point, which forms the left head of the great bay of Chatham Island, is a reef of rocks, called the Zealanders; they extend in this same direction to five miles from Jean Bart Point, but there is a good passage between them and the point.

At about twelve miles S. E. from Jean Bart Point, is the Point of Traffic (called by us Point Durham), which forms the south cape of the great bay (called by us Petre Bay); some small rocks, upon which the sea always breaks, extend about two-thirds of a mile from the point: they are called Jenny's Reef in the Admiralty chart.

At S. 11° E. from Point Durham, and about five and a half miles distance, is the south-west cape; near to this cape, to the northward of it, is a mountain with two peaks, which presents the form of a bishop's cap — hence the name of the cape, *evêque*.

At five miles S. 20° E. from Cape Evêque, is a rock under water, called the Solitary, upon which the sea breaks.

At fourteen miles E. 20° S. from Cape Evêque is Pitt Island, which does not exceed seven miles in length, north and south, nor three miles across, from east to west. This isle is thickly wooded; it is inhabited by a party of the aborigines of Chatham Island, and appears to be accessible only on the eastern side, in a narrow channel formed by the Attente Islet, to which it is very near.

Three rocks of remarkable form, which run about S. W. and N. E., lie to the westward of the south point.

A round rock, at about four miles S. 11° E. from the south point of Pitt Island, and E. 42° S. from Cape Evêque, has all the appearance of a bell.

At four miles N. 32° E. from the Bell Rock is a danger near the water's edge, upon which the sea breaks.

At eighteen miles east from the Bell Rock are three rocks, whose position is doubtful.

At seventeen miles E. 29° N. from the Bell Rock is a reef, whose position is not less doubtful (Star Quay Reef).

At twelve miles N. 28° E. from the Bell Rock is Round Islet. It is about three miles and a quarter from the north point of Pitt Island. There are some dangers between Round Islet and the point; but there may be, nevertheless, a passage between them.

There are many small sunken rocks to the south of Pitt Island, and four above water. The rocks are not above two and a half miles from the island.

About fourteen miles west of Chatham Island are the Bertier rocks. These are, one large and four small rocks, lying in a straight line east and west.

APPENDIX, No. VI.

(Copy) "Admiralty, 17th August, 1841.

"Sir,

"I am commanded by my Lords Commissioners of the Admiralty to acknowledge the receipt of your letter of the 7th of April last, and to express their lordships' great satisfaction at the successful result of the expedition under your orders, which, they are satisfied, nothing but unremitting zeal on your own part, and that of the officers and crew, could have accomplished on a service of so arduous a nature, wherein difficulties of no ordinary kind were to be encountered and overcome.

"I am, Sir,

"Your most obedient servant,

(Signed) "SIDNEY HERBERT."

"To Capt. James C. Ross,
H.M.S. Erebus, Falkland Islands."

(Copy) "Admiralty, 17th August, 1841.

"Sir,

"Having laid before my Lords Commissioners of the Admiralty your letter of the 7th of April last, representing the zealous and persevering exertions of the officers and men engaged in the expedition under your command, and recommending Commander F. R. M. Crozier, Lieutenant E. J. Bird, and Mr. A. J. Smith, to the favourable consideration of their lordships, I am commanded to acquaint you that my lords,—to mark the sense they entertain of the zeal and exertions displayed by the undermentioned officers on the present occasion—have been pleased to order commissions to be made out, promoting Commander Crozier to the rank of Captain, Lieutenant Bird to the rank of Commander, and Mr. A. J. Smith to the rank of Lieutenant.

"I am, Sir,

"Your obedient servant,

(Signed) "JOHN BARROW."

"To Capt. James C. Ross,
H.M.S. Erebus, Falkland Islands."

(Copy) "Admiralty, 14th July, 1842.

"Sir,

"I am commanded by my Lords Commissioners of the Admiralty to acquaint you, that they are pleased to approve of the Erebus bearing a commander in addition to her present establishment, and of the Terror bearing a purser in lieu of a clerk in charge, from the 16th of April last.

"I am, Sir,

"Your most obedient humble servant,

(Signed) "SIDNEY HERBERT."

"To Capt. James C. Ross,
H.M.S. Erebus, Falkland Islands."

(Copy) "Admiralty, 10th September, 1842.

"Sir,

"Having laid before my Lords Commissioners of the Admiralty your letter of the 28th of May last, reporting the repair of the Erebus, and your intention with regard to your future proceedings, I am commanded by their lordships to acquaint you, that if it should appear to you that any further prosecution of discovery in the southern ocean should be advisable, and afford a prospect of any important and successful extension of geographical and physical knowledge, their lordships are willing to leave the prosecution of it entirely to your discretion; otherwise they deem it expedient that you should return from the Cape to England.

"I am, Sir,

"Your most obedient humble servant,

(Signed) "JOHN BARROW."

"Captain James C. Ross,
H. M. S. Erebus, Cape of Good Hope."

(Copy) "Admiralty, 1st June, 1843.

"Sir,

"Having laid before my Lords Commissioners of the Admiralty your letter of the 4th of April last, reporting the proceedings of the Antarctic Expedition up to that date, I am commanded by their lordships to express to you, and to desire you to make known to the officers and men under your command their lordships' approbation of their zealous and exemplary conduct throughout the trying services you have detailed.

"I am, Sir,

"Your most obedient humble servant,

(Signed) "JOHN BARROW."

"To Capt. James C. Ross,
H.M.S. Erebus."
(To await arrival in England.)

APPENDIX, No. VII.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, AT SEA, AND IN PORT LOUIS, EAST FALKLAND ISLAND.

APRIL, 1842.

Day.	Position. Lat. S.	Position. Long. W.	Temperature of Air in the Shade. Max.	Min.	Mean.	Mean Temperature of Sea at Surface.
	° ′	° ′	°	°	°	°
1	57 20	70 22	42	37	39·6	43·3
2	57 25	67 36	43	39	41·2	44·3
3	56 41	65 09	42	38	39·6	43·7
4	54 47	61 51	41	38	39·8	45·2
5	52 36	58 42	49	38	42·9	47·1
6	Off Cape Pembroke		47	43	45·6	49·1
7	Port Louis. Berkeley Sound.		49	41	44·7	48·6
8			47	38	41·8	48·1
9			53	42	47·4	48·3
10			47	38	42·6	47·3
11			44	38	42·0	46·6
12			50	41	45·7	47·6
13			49	39	43·6	46·7
14			49	41	45·4	47·2
15			51	46	47·2	47·8
16			51	41	46·1	47·5
17			48	37	43·2	46·3
18			48	35	43·5	46·8
19			51	45	46·8	47·5
20			48	43	45·8	47·2
21			55	40	48·0	47·5
22			54	40	47·0	46·9
23			54	39	44·6	47·3
24			54	41	45·5	47·0
25			48	36	41·1	46·4
26			44	40	42·4	46·3
27			46	40	42·2	46·1
28			41	36	37·8	45·0
29			48	37	43·3	45·5
30			41	37	39·1	43·8
			55	35	43·52	46·6

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, AT SEA, AND IN PORT LOUIS, EAST FALKLAND ISLAND.

APRIL, 1842.

Day.	Barometer (corrected.) Max.	Min.	Mean.	Wind. Direction.	Force.	Weather.
	Inches.	Inches.	Inches.			
1	28·873	28·385	28·655	W. by S.	4·9	4 b.c.q.*
2	·834	·423	·692	E.N.E.	3·4	0 g.r.
3	·918	·534	·727	S.W.	4·7	0 q.r.
4	29·385	·895	29·050	West.	6·1	c.q.r.
5	·705	29·482	·610	S.W.	2·9	5 b.c.
6	·682	28·756	·302	N.E.	2·8	0 g.r.
7	28·972	·652	28·878	S.W.	4·2	4 b.c.p.r.
8	29·374	·928	29·208	S.W.	2·9	4 b.c.q.
9	·348	29·192	·263	W. by N.	2·6	6 b.c.
10	·644	·206	·312	W.S.W.	5·0	4 b.c.q.r.
11	·809	·501	·718	S.W.	2·2	0 g.r.
12	·536	·305	·376	S.W.	2·9	2 b.c.o.r.
13	30·037	·559	·868	S.E.	1·7	4 b.c.p.r.
14	·037	·951	·989	N.W.	1·9	0 g.r.
15	29·994	·701	·881	W.N.W.	1·5	0 g.r.
16	·910	·584	·639	Westerly.	2·6	3 b.c.q.p.r.
17	30·118	·856	30·071	S.W.	3·0	4 b.c.q.
18	·098	·658	29·880	N.W.	1·0	2 b.c.p.r.
19	29·778	·641	·704	Variable.	0·5	1 b.c.o.g.
20	·777	·582	·709	N. by W.	1·7	0 g.m.
21	·717	·422	·534	W.N.W.	2·2	5 b.c.
22	·735	·146	·420	N.W.	3·8	4 b c.
23	·721	·489	·655	W.N.W.	1·6	6 b.c.
24	·712	·496	·573	West	1·7	4 b.c.
25	·632	·525	·580	W. by N.	1·9	6 b.c.
26	·610	·353	·440	N.E.	1·9	0 r.
27	·420	·029	·278	W.N.W.	1·8	3 b.c.
28	·380	28·892	·121	S.W.	4·8	4 b.c.q.r.s.
29	·400	29·125	·213	W.S.W.	3·8	0 g.q.r.
30	·599	·245	·492	W.S.W.	3·0	4 b.c.
	30·118	28·385	29·428		2·8	

* For explanation of these symbols, see Appendix to Vol. I.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

MAY, 1842.

Day.	Temperature of Air in the Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.		Quantity of Rain.
	Max.	Min.	Mean.		Air in Shade.	Dew point.	
	°	°	°	°	°		Inches.
1	49	37	44·0	44·8	43		
2	51	43	46·3	45·8	46		0·19
3	47	38	43·7	45·2	42		·02
4	49	39	44·2	45·4	44		·27
5	47	38	41·5	44·8	42		·04
6	49	37	44·1	45·2	45		
7	45	35	41·6	44·3	45		·01
8	46	34	41·0	43·7	43		·01
9	51	42	45·6	45·2	45		·01
10	49	39	42·9	44·4	42		·12
11	49	43	46·0	45·5	46		·07
12	42	40	40·7	43·9	41		·12
13	47	39	44·0	44·7	45		·35
14	44	35	40·1	43·9	41		·08
15	47	35	39·9	43·3	40		
16	46	32	41·2	43·6	43		
17	47	40	44·4	45·2	47		·07
18	45	36	40·1	43·3	38		·01
19	50	34	40·6	43·6	42		
20	47	39	43·8	44·3	44		·51
21	48	40	43·9	44·3	44		
22	41	32	36·0	42·8	33		
23	46	33	39·0	43·0	39		
24	44	32	37·1	42·2	42		·05
25	41	29	35·5	41·9	29		·18
26	44	36	40·4	42·8	40		·18
27	34	29	32·1	41·0	33		·11
28	40	28	33·5	40·2	36		·07
29	45	30	38·2	41·3	42		·04
30	38	28	33·8	40·4	36		·12
31	32	26	28·9	38·4	29		
	51	26	40·78	43·50			2·63

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

MAY, 1842.

Day.	Barometer (corrected.)			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·504	29·398	29·457	W.N.W.	1·5	0 g.
2	·388	·006	·202	Westerly	2·1	0 r.
3	·546	·230	·418	North	1·8	0 g.d.
4	·423	·203	·310	S.W.	2·0	2 b.c.r.
5	·651	·401	·497	West	3·0	4 b.c.
6	·651	·037	·315	W.N.W.	2·3	0 m.r.
7	·795	·058	·464	S.W.	3·4	4 b.c.
8	·848	·532	·745	N.W.	1·6	3 b.c.
9	·515	·176	·332	Westerly	2·0	0 g.p.r.
10	·619	·333	·525	Westerly	2·6	4 b.c.
11	·298	28·817	28·988	West	2·0	0 g.m.d.
12	·568	29·010	29·400	S.E.	3·3	0 m.
13	·413	28·876	051	N.N.W.	2·0	g.f.r.
14	·552	29·014	·315	S.W.	4·1	3 b.c.
15	·980	·581	·786	W.S.W.	2·3	6 b.c.
16	·924	·543	·766	N.N.W.	2·0	0 m.g.
17	·516	·259	·332	N.W.	2·7	0 f.r.
18	·792	·426	·678	Westerly	2·8	6 b.c.
19	·922	·804	·884	West	0·9	6 b.c.
20	·792	·306	·495	North	3·5	0 g.r.
21	·366	·234	·291	West	1·0	0 f.m.
22	·597	·370	·451	Westerly	2·1	6 b.c.
23	·624	·094	·426	Westerly	2·4	4 b.c.
24	·068	28·737	28·865	Westerly	2·0	0 m.r.
25	28·936	·583	·857	West	2·0	5 b.c.
26	·796	·440	·645	West	3·6	5 b.c.
27	29·052	·796	·962	West	1·8	3 b.c.p.s.
28	·295	·968	29·102	West	2·9	4 b.c.
29	·280	·798	28·978	N.W.	3·1	0 q.r.
30	28·970	·780	·893	West	1·4	4 b.c.
31	29·055	·953	·989	West	1·6	5 b.c.
	29·980	28·440	29·304		2·32	

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

JUNE, 1842.

Day.	Temperature of Air in the Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.		Quantity of Rain.
	Max.	Min.	Mean.		Air in Shade.	Dew point.	
	°	°	°	°	°		Inches.
1	33	27	30·4	38·8	32		0·11
2	36	27	32·1	38·3	32		.05
3	39	29	35·4	39·8	36		·01
4	41	32	38·1	40·2	38		·45
5	40	30	33·2	39·0	34		·12
6	38	30	33·9	39·4	35		·07
7	38	28	34·1	39·3	31		·11
8	40	32	36·9	39·8	39		·12
9	35	27	32·0	38·6	33		·05
10	32	23	28·6	37·8	27		·03
11	36	29	32·6	38·0	32		·01
12	37	33	35·3	39·0	36		·30
13	37	36	36·3	39·5	36		·22
14	41	36	38·2	39·7	37		·13
15	39	33	36·8	39·7	36		
16	43	37	40·3	40·7	40		·74
17	39	37	38·3	40·5	38		·02
18	42	39	40·4	41·1	40		
19	43	35	39·0	41·2	39		·25
20	42	32	36·6	40·0	33		·03
21	40	30	37·2	40·3	38		·48
22	40	29	32·7	39·2	30		·23
23	35	29	31·3	38·3	30		·10
24	38	26	32·0	37·7	27		
25	38	30	33·3	38·1	30		·12
26	37	31	33·5	38·1	33		·04
27	35	26	30·4	37·2	33		·05
28	29	21	26·0	36·1	25		·04
29	33	21	28·5	35·8	28		·20
30	35	24	29·9	37·3	30		·01
	43	21	34·11	38·95			4·09

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

JUNE, 1842.

Day.	Barometer (corrected.)			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·460	29·059	29·238	S.S.W.	4·4	0 g.p.s.
2	·729	·506	·653	W.S.W.	2·3	4 b.c.
3	·703	·248	·506	N.E.	4·2	0 g.r.
4	·207	28·865	·039	N.E.	1·4	0 g.r.
5	28·923	·696	28·787	W.S.W.	2·7	4 b.c.
6	29·572	·935	29·251	S.W.	2·0	4 b.c.
7	·581	29·319	·456	West	3·7	4 b.c.q.r.
8	·471	·221	·326	West	3·5	0 q.r.
9	·726	·469	·582	S.W.	2·5	4 b.c.q.s.
10	·738	·618	·680	West	0·7	0 b.c.
11	·615	·397	·481	N.E.	1·7	0 p.r.s.
12	·424	·337	·370	E.N.E.	3·3	0 g.r.
13	·482	·360	·400	E.N.E.	2·5	0 d.r.
14	·958	·484	·732	E.N.E.	0·5	2 b.c.d.r.
15	30·034	·847	·978	N.N.E.	2·6	0 g.
16	29·814	·641	·685	Northerly	1·7	0 q.r.
17	·670	·624	·651	W.N.W.	0·3	0
18	·684	·356	·427	N.N.E.	2·5	0 r.
19	·469	·266	·381	West	0·9	3 b.c.
20	·547	·376	·493	West	0·5	6 b.c.
21	·363	28·976	·112	North	3·1	0 q.r.
22	·181	29·090	·138	N.N.W.	0·6	6 b.c.
23	·240	·135	·172	West	0·7	4 b.c.
24	·523	·246	·379	S.W.	0·7	6 b.c.
25	·550	·354	·475	S.W.	1·2	4 b.c.
26	·429	·134	·256	West	1·7	4 b.c.
27	·221	·091	·154	West	2·5	5 b.c.
28	·580	28·986	·201	South	3·8	4 b.c.q.s.
29	·670	29·342	·501	West	2·4	4 b.c.
30	·494	·308	·375	West	1·9	4 b.c.
	30·034	28·696	29·396		2·08	

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

JULY, 1842.

Day.	Temperature of Air in the Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.		Quantity of Rain.
	Max.	Min.	Mean.		Air in Shade.	Dew Point.	
	°	°	°		°		Inches.
1	33	23	27·4	35·8	24		0·01
2	33·5	24	27·6	35·8	25		·11
3	30	23·5	27·0	35·2	26		·11
4	36	30	34·0	37·9	34		·24
5	42	36	37·9	38·7	37		·01
6	40	34	36·3	38·3	34		
7	39	34	37·0	39·6	39		·09
8	40·5	33·5	36·8	40·0	38		·28
9	36	30	33·3	38·5	33		
10	35·5	28·5	31·8	38·6	29		·04
11	40·5	34	36·5	39·3	36		·02
12	36	26·5	29·6	37·9	29		·01
13	36	28·5	32·6	38·0	30		·09
14	36·5	32	34·3	38·1	33		·01
15	36·5	31	33·5	38·2	32		·03
16	40·5	32·5	34·4	38·4	33		
17	37	33	34·9	38·6	34		·01
18	37·5	34	36·0	39·5	36		·33
19	37	32	35·7	39·9	36		·51
20	36	30	33·2	38·9	32		·06
21	36	28·5	31·9	38·5	31		·03
22	35	29	31·7	38·1	32		·01
23	37	26·5	32·2	38·3	29		
24	38	33	36·0	39·3	36		·08
25	39	37	37·9	40·2	38		·05
26	37·5	36	36·7	40·2	36		
27	37	34	35·4	40·1	35		·02
28	38·5	33	35·6	40·6	34		·01
29	40·5	32	35·6	40·5	39		·08
30	38	32	34·7	40·0	35		·04
31	35	27·5	31·6	39·6	33		·01
	42	23	33·84	38·73			2·29

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

JULY, 1842.

Date.	Barometer (corrected).			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·473	29·144	29·281	West	1·9	4 b.c.*
2	·718	·138	29·294	W.S.W.	3·7	0 s.
3	30·206	·785	30·100	S.W.	1·7	5 b.c.
4	·110	·307	29·733	N.N.W.	3·3	0 g.m.
5	29·403	·205	·331	W.N.W.	2·3	4 b.c.
6	·352	·247	·298	W.S.W.	1·3	0 m.f.
7	·255	28·854	·073	A.M. N.W. P.M. W.S.W.	2·1	0 g.
8	·169	·847	28·956	West	2·6	4 b.c.
9	·470	·980	29·161	West	3·4	4 b.c.
10	·765	·502	·691	West	1·8	6 b.c.
11	·775	·604	·683	W.N.W.	2·8	5 b.c.
12	·582	·375	·457	S.W.	2·6	4 b.c.
13	·834	·442	·709	S.W.	4·0	4 b.c.
14	30·324	·844	30·198	S.W.	2·7	3 b.c.
15	·523	·340	·431	W.S.W.	1·3	A.M. 4 b.c. P.M. 0 m.
16	·554	·491	·528	West	1·2	2 b.c.
17	·534	·350	·448	W.N.W.	1·5	3 b.c.
18	·296	29·717	·015	N.N.W.	2·8	0 q.r.
19	29·688	·323	29·436	N.N.W.	2·1	0 c.r.
20	·745	·385	·578	S.W.	2·3	4 b.c.
21	30·129	·750	·908	S.W.	2·2	4 b.c.
22	·275	30·146	30·215	S.W.	2·9	3 b.c.
23	·293	·238	·266	West	2·4	5 b c.
24	·235	29·869	29·986	W.N.W.	3·3	0 m.r.
25	29·902	·571	·747	N.W.	3·0	0 m.r.
26	·519	·383	·438	West	1·1	0 m.
27	·857	·504	·681	S.W.	1·1	3 b.c.
28	·859	·350	·628	North	2·0	0 c.
29	·306	28·748	·034	Westerly	2·8	0 m.c.
30	·232	29·060	·123	West	2·7	4 b.c.
31	·364	·100	·196	S.W.	1·8	3 b.c.
	30·554	28·340	29·665		2·34	

* For explanation of these symbols see Appendix to Vol. I.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

AUGUST, 1842.

Day.	Temperature of Air in the Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.		Quantity of Rain.
	Max.	Min.	Mean.		Air in Shade.	Dew point.	
	°	°	°	°	°		Inches.
1	36	25·5	31.1	38·5	29		0·01
2	37	29	32·5	38·6	32		·03
3	36	27·5	31·8	38·5	29		·01
4	37·5	33	35·4	39·5	35		·87
5	33·5	24	29·1	37·8	32		·20
6	34	25·5	2 77	37·0	27		·10
7	26	20·5	23·3	32·3	22		·52
8	32	20·5	26·1	33·5	28		·14
9	32·5	26·5	29·6	35·4	29		·10
10	34·5	28·5	30·7	35·2	30		·02
11	34	29	31·5	36·2	30		
12	37	32	35·1	37·7	35		·01
13	37	26	35·5	36·9	28		
14	38·5	33·5	35·5	37·6	35		
15	38·5	34	36·6	38·3	37		
16	39·5	35	36·9	39·0	36		
17	39	31	34·5	38·9	35		
18	34·5	28	31·9	38·2	34		·03
19	39·5	25	31·7	37·5	28		
20	34·5	30·5	33·1	38·1	32		·09
21	41	33	36·8	39·2	37		·89
22	39·5	34	35·8	39·3	35		
23	38	32·5	34·9	38·8	35		·01
24	37	30	32·9	38·4	33		
25	41·5	31	36·3	39·0	35		·01
26	40·5	35	37·4	39·5	39		·02
27	45	35	38·8	39·5	38		
28	47	37·5	40·5	40·1	38		
29	47	38	41·6	40·5	42		
30	49	38	42·9	41·2	42		
31	44	36	40·4	40·7	41		·05
	49	20·5	34·13	38·10			3·11

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS, PORT LOUIS, EAST FALKLAND ISLAND.

AUGUST, 1842.

Day.	Barometer (corrected).			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·832	29·400	29·608	W.S.W.	3·7	4 b.c.*
2	30·042	·849	·967	W.S.W.	1·9	6 b.c.
3	·050	·610	·923	N.W.	1·4	4 b.c.
4	29·527	·058	·172	N.W.	3·9	0 q.r.
5	·513	·092	·286	Southerly	5·5	0 q.p.s.
6	·519	·372	·462	S.W.	4·3	4 b.c.q.s.
7	·552	·506	·526	Southerly	4·4	0 q.s.
8	.928	·574	·666	S S.E.	4·0	0 q.p s.
9	30·261	·931	30·091	S E.	2·3	2 b.c.p.s.
10	·284	30·210	·258	E.S E.	0·6	0 g.c.
11	·197	29·859	·034	Northerly	1·5	0 g.
12	29·918	·721	29·782	Northerly	1·0	0 f.
13	30·083	·943	30·026	Easterly	1·5	4 b.c.
14	29·940	·677	29·794	N. W.	1·0	0 f.
15	·689	·333	·461	N. W.	3·3	0 g.q.
16	·280	·046	·150	N. W.	3·4	4 b.c.q.
17	·427	.142	·308	Westerly	2·5	4 b.c.
18	·712	·375	·553	S.W.	3·0	3 b.c. 0 r.
19	·740	·683	·717	Variable	0·7	5 b.c.
20	·683	·422	·524	N.E.	1·9	0 s.
21	·436	28·867	·035	N.W.	2·6	0 q. r.
22	·215	·880	.039	S.W.	3·2	3 b.c.
23	·440	29·226	·397	S.W.	2·7	1 b.c.
24	·788	·446	·564	S.W.	1·1	3 b.c.
25	30·185	·824	30·030	Westerly	1·4	4 b.c.
26	·226	30·186	·203	Westerly	1·3	2 b.c.
27	·192	·091	·123	Westerly	1·8	3 b.c.
28	·065	29·845	29·922	Westerly	2·7	3 b.c.
29	29·841	·529	·683	W.N.W.	2·7	3 b.c.
30	·525	·446	·540	W.N.W.	1·7	3 b.c.
31	·435	·253	·342	N.W.	2·7	0 r.
	30·284	28·867	29·654		2·41	

* For explanation of these symbols see Appendix to Vol. I.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS.

SEPTEMBER, 1842.

Day.	Position at Noon.		Temperature of Air in the Shade.			Mean Temperature of Sea at Surface.
	Lat. S.	Long. W.	Max.	Min.	Mean.	
	° ′	° ′	°	°	°	°
1	Port Louis. East Falkland Island.		49	36	41·3	41·2
2			49	38	42·3	41·7
3			45·5	33·5	40·1	41·2
4			44	31	38·2	40·6
5			43·5	36	38·7	41·0
6			46·5	35	38·3	40·7
7			42·5	32	37·8	40·7
8			40·5	36·5	39·0	41·8
9	53 3	57 55	40	32	35·5	41·0
10	53 19	56 49	39	31·5	34·5	40·3
11	54 11	55 22	40	36	38·1	40·7
12	54 19	54 47	40	34	36·3	40·2
13	54 6	54 37	34·5	30·5	32·3	39·3
14	53 47	55 12	40·5	33	37·7	40·4
15	54 44	55 28	39·5	31	35·6	40·7
16	54 41	55 12	37·5	30	33·5	40·3
17	55 08	59 16	33·5	28·5	31·0	40·0
18	55 40	63 08	34	29	31·9	39·6
19	Off Cape Horn.		40·5	34·5	37·2	41·7
20	St. Martin's Cove. Hermite Island.		45	33	37·9	43·2
21			45	33·5	39·6	43·5
22			49·5	37	42·5	44·1
23			50	40·5	45·6	44·6
24			47	40	44·0	43·8
25			40	32·5	35·7	41·8
26			47	32·5	41·1	43·3
27			54	41	47·7	44·9
28			51·5	40	44·6	44·2
29			51·5	39·5	44·7	44·1
30			46·5	39	41·7	44·2
			54	28·5	38·88	41·83

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS.

SEPTEMBER, 1842.

Day.	Barometer (corrected).			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·449	29·349	29·426	N.W.	1·9	5 b.c.*
2	·555	·315	·396	N.W.	1·0	0 m.
3	·763	·531	·601	Westerly	2·0	4 b.c.
4	30·116	·766	·918	S.E.	2·2	3 b.c.
5	·189	30·123	30·149	Southerly	2·1	c. 0
6	·189	29·992	·115	N.W.	0·5	0 p.s.
7	29·960	·402	·678	N. by W.	2·2	2 b.c.p.s.
8	·377	·188	·269	Westerly	3·5	1 b.c.r.
9	·308	28·792	28·980	Westerly	5·1	0 q.s.
10	·347	·720	29·140	S.S.W.	7·6	0 q.s.
11	·218	·512	28·787	W.S.W.	7·5	0 q.d.
12	28·847	·596	·757	S.S.W.	7·2	3 b.c.q.
13	29·562	·715	29·137	Southerly	5·0	0 q.s.
14	·553	·934	·234	Westerly	4·3	0 g.r.s.
15	·670	·882	·214	S.W.	7·3	0 q.s.
16	·751	29·597	·682	Variable	2·6	0 g.s.
17	30·226	·624	30·005	S.E.	5·1	0 p.s.
18	·239	·814	·119	Easterly	3·7	3 b.c.
19	29·809	·534	29·628	N.W.	4·5	2 b.c.
20	·828	·647	·756	W.N.W.	1·2	4 b. c.p.s.
21	·795	·575	·659	N.W.	1·3	5 b.c.
22	·748	·618	·686	S.W.	1·3	5 b.c.
23	·614	·323	·466	S.W.	0·8	3 b.c.
24	·315	·073	·248	S.W.	1·3	3 b.c.
25	·494	·165	·337	S.W.	3·0	0 q.s.
26	·590	·531	·551	S.W.	2·4	2 b.c.
27	·627	·347	·491	S.W.	1·8	4 b.c.
28	·529	·219	·351	S.W.	1·8	4 b.c.p.r.
29	·532	·198	·329	S.W.	1·3	4 b.c.
30	·466	·272	·359	S.W.	2·5	4 b. c.r.s.
	30·239	28·512	29·5756		3·15	

* For explanation of these symbols see Appendix to Vol. I.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS.

NOVEMBER, 1842.

Day.	Temperature of Air in the Shade.			Mean Temperature of Sea at Surface.	Temperature at 9 A.M.		Quantity of Rain.
	Max.	Min.	Mean.		Air in Shade.	Dew point.	
	°	°	°	°	°	°	Inches.
1	43	38	40·6	45·5	42	38	0·16
2	47·5	38·5	42·7	45·7	46	33	—
3	48	38·5	42·1	45·7	44·5	38	—
4	50	41	44·8	46·8	46	42	—
5	48·5	40	42·9	46·1	42	38	0·12
6	50	39·5	43·2	47·1	45·5	42	0·02
7	44·5	37	39·9	45·9	39	37	0·40
8	42·5	39	40·1	43·3	41	40	—
9	41	39	40·1	42·0	40	40*	0·35
10	46	39	42·2	42·6	43	40	0·05
11	43·5	38	40·8	42·8	40	35	—
12	46	40	43·1	44·4	43	38	0·01
13	59·5	40	46·0	45·5	47	42	—
14	54	42	46·8	48·1	49	39·5	—
15	51	38	45·0	47·3	46	39	—
16	61	42·5	48·8	48·5	49	44	—
17	51·5	42·5	46·5	48·0	46	46*	0·05
18	52	39·5	45·6	47·9	48	33	0·05
19	57	44	48·9	48·5	54	44	0·09
20	63	44	51·0	48·8	55	43	—
21	64	43	53·1	49·8	57	43	—
22	60	41	51·5	50·3	56	42	—
23	70	44	56·4	51·5	60	48	—
24	61	43	51·3	50·9	55	38	—
25	53	39·5	45·3	49·7	54	37	—
26	54	38	47·2	50·2	50	40	0·10
27	47	42	44·9	49·5	46	30	—
28	56·5	42	49·4	50·3	53	41	—
29	62	43	52·1	50·2	55	43	—
30	52	39·5	44·1	49·1	49	43	—
	70	37	45·88	47·40			1·40

* Rain.

ABSTRACT FROM THE METEOROLOGICAL JOURNAL OF H.M.S. EREBUS.

NOVEMBER, 1842.

Day.	Barometer (corrected).			Winds.		Weather.
	Max.	Min.	Mean.	Direction.	Force.	
	Inches.	Inches.	Inches.			
1	29·854	29·737	29·813	E.N.E	0·8	P.M. 5 b.c.*
2	·715	·511	·583	A.M. S.W. P.M. N.E.	1·4	6 b.c.v.
3	·568	·297	·488	A.M. N.W. P.M. E.N.E.	1·6	4 b.c.
4	·308	·172	·214	—	1	4 b.c.
5	·432	·318	·398	S.W.	1·2	1 b.c.m.d.
6	·643	·400	·495	P.M. S.W.	0·8	4 b.c.p.r.
7	·719	·582	·662	S.W.	2·6	2 b.c.g.
8	·543	·203	·541	N.N.W.	3·8	4 b.c. 0 g.d.r.
9	·470	·184	·311	N.E.	3·6	0 m.d.
10	·851	·484	·665	A.M. N.E.	1·2	3 b.c.
11	30·077	·860	30·003	Southerly	3·8	3 b.c.p.d.
12	·120	·986	·025	S.W.	3·5	4 b.c.
13	29·974	·702	29·811	Westerly	3·0	4 b.c.
14	·965	·787	·895	A.M. S.S.W. P.M. N.W.	1·5	5 b.c.
15	·974	·773	·904	N.W. by N.	2·0	4 b.c.
16	·742	·441	·578	N.W.?	1·3	1 b.c. o g.
17	·416	·133	·229	A.M. N.N.E. P.M. N.W.	2·3	0 g.r.
18	·427	·189	·294	A.M. S.S.W. P.M. W.N.W	3·4	3 b.c.p.r.
19	·374	·051	·211	Westerly	2·9	6 b.c.p.r.
20	·536	·366	·467	W.N.W.	2·0	4 b.c.
21	·864	·414	·600	Westerly	2·6	5 b.c.
22	·875	·691	·782	N.W.	2·5	4 b.c.
23	·710	·513	·649	Westerly	1·5	3 b.c.
24	·755	·483	·622	W.S.W.	4·4	5 b.c.
25	·763	·387	·614	W. by N.	2·1	g.c. o r.
26	·422	·358	·388	S.W.	3·2	4 b.c.
27	·592	·402	·509	S.S.W.	4·8	2 b.c.p.r.h.
28	·578	·168	·263	W.N.W.	3·0	2 b.c.q.
29	·137	28·979	·039	W.S.W.	3·3	3 b.c.
30	·282	29·054	·114	P.M. S.E.	2·9	0 m.d.
	30·120	28·979	29·5389			

* For explanation of these symbols see Appendix to Vol. I.

APPENDIX, No. VIII.

MAGNETIC AND CURRENT OBSERVATIONS.

Date, 1843.	Position at Noon.		Magnetic.		Current.	
	Lat. S.	Long. E.	Dip.	Variation.	Direction.	Velocity per Diem.
May	° ′	° ′	° ′	° ′		Miles.
1	34 27	17 37	52 32	—	North	12
2	33 12	16 24	52 24	27 0	North	10
3	32 13	15 5	50 35	27 12	N. 62 E.	25
4	30 29	12 36	48 46	27 34	N. 60 W.	12
5	28 39	9 57	46 1	26 49	N. 60 W.	20
6	26 34	7 31	42 45	26 26	N. 67 W.	17
7	24 52	5 15	39 25	24 29	N. 62 W.	12
8	23 14	3 9	36 47	24 48	N. 66 W.	13
9	21 43	1 10	33 29	23 37	West	12
		West				
10	20 24	0 33	30 20	23 26	S. 64 W.	9
11	18 37	2 25	26 43	22 6	West	17
12	16 42	4 21	22 0	20 15	N. 86 W.	12
13 to 20	at St. Helena					
21	14 40	7 24	17 27	18 3	S. 31 W.	10
22	13 25	9 13	13 21	16 1	S. 53 W.	13
23	11 45	10 56	9 34	14 46	S. 73 W.	14
24	10 7	12 38	4 25	12 28	S. 27 W.	18
			North			
25	8 7	14 10	0 17	12 52	N. 81 W.	34
26 to 28	at Ascension					
29	7 59	14 35	0 19			
30	9 17	16 16	0 30	9 9	S. 16 W.	14
			South			
31	10 52	18 21	1 20	16 37	S. 83 W.	16
June						
1	12 43	20 26	2 57	15 2	West	16
2	14 20	22 21	4 42	13 49	S. 66 W.	17
3	15 3	23 14	5 31	12 58	S. 61 W.	10
4	15 20	23 35	5 51	13 57	S. 53 W.	10
5	16 16	25 5	6 14	13 48	N. 84 W.	19
6	17 55	27 23	7 8	12 3	S. 66 W.	29
7	20 7	29 12	11 22	9 21		
8	21 45	31 16	12 52	8 15	S. 38 W.	24
9	22 24	32 53	12 53	7 32	S. 7 W.	7
10	22 37	34 57	13 2	6 44	S. 86 W.	14
11	22 59	36 56	13 19	4 54	S. 43 W.	14

Date, 1843.	Position at Noon.		Magnetic		Current.	
	Lat. S.	Long. W.	Dip	Variation.	Direction.	Velocity per Diem.
June	° ′	° ′	° ′	° ′		Miles.
12	22 48	39 6	13 4	2 33	S. 50 W.	10
13	23 57	39 20	13 1	2 9	S. 56 W.	6
14	23 1	40 50	13 4	1 18	N. 85 W.	22
15	22 59	41 31	13 3			
16	22 56	41 54	13 12		N. 26 E.	22
17	23 14	42 31	12 56	0 02		
18 to 25	Rio Janeiro					
				East		
26	23 31	41 59	13 11	1 08	South	9
27	22 36	40 15	12 35	0 52	N. 64 E.	3
				West		
28	21 21	37 57	10 30	0 7	North	13
29	20 34	35 55	9 12	2 8	N. 24 E.	12
30	19 32	33 25	8 1	4 16	N. 24 E.	11
July						
1	18 23	31 53	6 15	6 0	N. 16 W.	15
2	16 39	30 25	4 32	7 15	N. 36 W.	30
3	14 42	28 47	1 45	8 34	N. 26 W.	29
			North			
4	11 23	27 54	2 42	9 50	N. 38 W.	29
5	8 56	27 10	7 24	10 12	N. 76 W.	25
6	7 1	27 4	11 1	11 52	S. 88 W.	25
7	5 26	26 54	13 25	11 10	S. 76 W.	15
8	3 47	26 47	16 15	11 36	S. 80 W.	18
9	1 53	26 21	19 59	12 48	S. 87 W.	25
10	0 19	26 0	22 34	12 51	N. 68 W.	21
	North					
11	1 7	25 56	24 17	13 1	N. 80 W.	23
12	3 13	26 7	28 5	13 29	S. 88 W.	55
13	5 8	25 7	30 49	14 5	S. 49 W.	11
14	6 39	24 23	31 52	15 23	N. 80 E.	17
15	7 42	23 59	33 28	13 34	N. 86 E.	18
16	8 50	23 48	35 1	15 12	N. 60 E.	16
17	10 30	23 54	37 55	12 5	N. 60 E.	18
18	10 55	24 3	38 8	13 32	South	10
19	11 41	25 6	40 19	13 12	West	21
20	12 1	25 26	40 38	14 7	S. 10 E.	11
21	11 58	26 1	41 6	13 43	S. 49 W.	21
22	12 36	25 35	41 42	14 41	None	
23	13 10	25 54	42 23	13 56	S. 79 W.	5
24	14 15	27 10	44 14	13 42	S. 73 W.	21
25	15 35	28 13	46 10	13 55	None	15
26	16 54	28 57	47 54	13 24	S. 61 W.	21
27	18 12	29 54	49 27	14 48	S. 67 W.	25
28	19 26	31 10	51 24	13 25	S. 70 W.	12
29	20 50	32 9	53 13	14 37	S. 78 W.	19
30	22 10	32 36	54 26	14 53	S. 67 W.	9
31	23 36	33 23	56 15	13 46	S. 58 W.	17

Date, 1843.	Position at Noon.		Magnetic		Current.	
	Lat. N.	Long. W.	Dip N.	Var. W.	Direction.	Velocity per Diem.
Aug.	° ′	° ′	° ′	° ′		Miles.
1	24 53	34 33	57 43	15 17	S. 51 W.	18
2	26 19	35 0	59 10	14 1	S. 84 W.	15
3	28 12	34 49	60 45	16 30	S. 82 W.	9
4	29 53	35 8	62 4	16 12	N. 87 W.	16
5	31 5	36 10	63 5	18 12	S. 42 W.	12
6	31 50	36 45	63 48	18 5	S. 45 W.	9
7	33 0	36 19	64 28	19 51	East	4
8	34 21	35 32	65 33	21 39	S. 57 E.	3
9	35 6	35 0	66 7	22 6	S. 42 E.	6
10	36 13	34 53	66 23	19 37	South	2
11	36 43	34 45	68 19	19 42	S. 73 W.	10
12	37 24	34 44	68 36	23 26	S. 82 W.	21
13	37 36	34 43	68 46	23 36	West	6
14	37 48	34 46	68 48	23 56	S. 32 W.	11
15	38 30	34 40	69 10	23 34	S. 27 W.	7
16	39 12	34 31	69 14	27 13	N. 36 W.	14
17	39 44	33 53	69 47	26 54		
18	39 58	32 26	69 21	26 56		
19	39 41	31 0	—	—		
20	40 5	29 40	69 6	28 38	S. 20 W.	9
21	40 25	28 33	69 4	29 32	S. 26 W.	18
22	41 18	26 48	69 6	29 49	S. 5 W.	9
23	42 33	23 52	69 4	30 6	S. 78 E.	9
24	43 30	21 51	68 59	29 35	S. 27 E.	3
25	44 57	19 1	69 03	30 9	S. 25 W.	12
26	46 11	16 42	69 12	29 39		
27	47 12	13 31	—	—		
28	48 44	10 6	69 12	28 53		
29	49 30	7 19	69 42	27 45		
30	49 38	6 28	69 40	26 18		
31	49 26	5 49	69 20	24 57		

APPENDIX, No. IX.

GEOGRAPHICAL TABLE.

Name and Description of Place.	Latitude South.	Longitude West.
	° ′	° ′
Admiralty Inlet (centre) - -	64 16	57 0
Cockburn Island - - -	64 12	56 49
Corry, Cape - - - -	63 37	57 19
Danger Islets (Easternmost) - -	63 20	54 35
„ (Northernmost) - -	63 18	54 56
Darwin Islet - - - -	63 31	54 48
D'Urville Monument - - -	63 20	56 26
Eden, Cape - - - -	63 28	55 35
Fitzroy, Cape - - - -	63 6	55 21
Foster, Cape - - - -	64 27	58 7
Gage, Cape - - - -	64 7	57 7
Gordon, Cape - - - -	63 49	57 19
Gulf of Erebus and Terror (centre) -	63 45	56 45
Haddington Mount - - -	64 12	58 2
Hamilton, Cape - - -	64 16	57 7
Herbert Bay - - - -	63 54	57 25
King, Cape - - - -	63 3	55 42
Lockyer, Cape - - - -	64 29	57 45
Moody, Point - - - -	63 20	55 5
Paulet Island - - - -	63 37	55 40
Percy, Mount (centre) - - -	63 17	55 34
Puget, Cape - - - -	63 30	55 42
Purvis, Cape - - - -	63 39	55 48
Seymour, Cape - - -	64 13	56 32
Snow Hill - - - -	64 29	57 11

APPENDIX, No. X.

NOTE ON THE POSITION OF THE MAGNETIC POLES.

(Referred to, Vol. I. p. 247., and Vol. II. p. 357.)

Professor Gauss, in his General Theory of Terrestrial Magnetism, states, that "the exact computation of the places of these two poles, according to our elements, gives them as follows: —

"1. In 73° 35′ north latitude, and 95° 39′ west longitude from Greenwich, the total intensity being 1·701 on the unity in common use.

"2. In 72° 35′ south latitude, and 152° 30′ east longitude, the total intensity 2·253.

"According to Captain James Ross's observation, the north magnetic pole falls 3° 35′ to the south of its position, according to our calculation, which gives at that place a direction of the magnetic force differing 1° 12′ from observation, as may be seen in the table of comparisons.* We must expect a considerably greater displacement of the position of the southern pole. At Hobart Town, which is the nearest station to this pole, calculation gives too low a dip by 3° 38′, as far as the observation can be depended upon. It seems probable, therefore, that the actual south magnetic pole is considerably to the north of the position given by our calculation; and that it may be looked for in about 66° S. latitude, and 146° E. longitude."

It was this last paragraph in which M. Gauss infers the place of the south magnetic pole, that was the occasion of my instructions directing me to seek it in latitude 66° S., rather than in the position which M. Gauss's theory places

* Scientific Memoirs, vol. ii. part 6. p. 224.

it. The result has proved the latter to be the more correct; and it is curious to observe that the error of its computed place is not very different from that of the north magnetic pole. In the latter case, my observations placed the pole 3° 35′ south of that given by M. Gauss's theory; and a careful combination of all the observations of our late voyage, assigns the position of the south magnetic pole in 75° 5′ S., and longitude 154° 8′ E., or about 2° 30′ also *south* of its place as computed by Professor Gauss. It is to be hoped that the accession of so great a number of observations as the Antarctic Expedition has supplied, will afford M. Gauss the means of perfecting his theory, by which, even with the inaccurate observations he before possessed, enabled him to calculate within very narrow limits the three magnetic elements at any given point on the surface of our globe.

THE END.

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